The Builder.

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Sanitary Legislation in Denmark.

THE Danish Government showed its interest in the discussions of the Congress of Hygiene last week in a very practical manner, by compiling a volume of more than 450 pages of statistics of sanitary legislation in Denmark, written by eminent men who hold official positions in various departments under the Government, and sending a number of copies of this volume over for distribution among members of the Congress.

The volume* includes of course a considerable amount of purely medical information, which we pass over. From the chapter on Sanitary By-laws we learn that by an Act passed as a temporary measure in 1858, and confirmed as a permanent one in 1868, Copenhagen and the provincial towns are compelled, and the rural parishes given power, to pass sanitary By-laws,—the passing of such By-laws in the rural districts being dependent on the sense of the populace as to the importance of sanitation. As might have been expected, it was a whole generation before these rural districts awoke to the importance of such legislation, and at the present moment this feeling is very irregularly developed among them, and large tracts of country are without any By-laws. The experience of Denmark in this respect seems to show that compulsory legislation is a wiser theory than permissive legislation. If people are compelled to legislate on sanitary matters, they may do it grudgingly and imperfectly, but still they will do something, and will prepare the way for better work in the next generation.

In regard to the subjects dealt with by the Danish By-laws, we learn that most of the rural and all the town By-laws contain stipulations intended to prevent the pollution of drinking water, but that in the rural districts, where the supply is mostly from dug surface wells, these By-laws have often very little significance; as far as they exist, they concern the construction of the well, its distance from privies and dungheaps, &c. It is noted in another part of the report that these regulations, partial as they are, have brought about a considerable improvement in some districts.

The metropolis and twenty-five provincial towns have a central water-supply, mostly from wells or artesian borings. The metropolis and fourteen out of the sixty-seven provincial towns have a complete, or nearly complete, system of sewers; twenty-five towns are partially provided with sewers; the remainder have only open drains. In regard to removal of refuse, only twelve of the urban By-laws provide for the removal of refuse and soil as a public measure: outside of the towns the By-laws in almost every case leave the removal of refuse to private enterprise. Further details would probably show that, as in English rural districts, this means the removal of refuse as little as can be helped, and at as long intervals as possible. The organisation of Local Boards of Health is described as very faulty in principle; the number of members of such Boards is not large, and in general the communal administration and economic interests are largely represented, while hygienic and technical knowledge is often entirely wanting. The public medical officers frequently complain that the By-laws are a dead letter; similar complaints are not unfrequently met with in the reports to our own Local Government Board on the causes of disease in rural districts. Herr Hoff, however, the writer of this portion of the Danish report, evidently considers Denmark to be much behind England in these matters, and compares the present state of things in Denmark to that existing in England before the passing of the Public Health Act in 1875.

A chapter is devoted to the water supply of Copenhagen. The present waterworks were carried out in 1860, built by the City and managed at the expense of the City. At first the supply was partly surface water sand-filtered, and partly from artesian wells; but as the consumption increased and the supply proved inadequate, the Corporation purchased the Sönder lake, about 20 kilomètres from the City. The lake water, however, caused a good deal of trouble, in giving rise to the formation of an alga (*chrenothrix*) which made filtration almost impossible: a danger to be noted in the employment of lake water. The water taken from subterranean strata, on the other hand, was "perfectly magnificent," and it was deemed advisable to increase this source of supply; with this object a careful hydrographic survey of the adjacent country was made, and a considerable number of new deep wells established. A map of the water supply, with contour lines of the level of underground water, is appended to the report. The only difficulty with the subterranean water was the presence of a small proportion of ferrous oxide, and a stretch of the water conduit was built as an open concrete conduit, in which the iron is oxidised to ferric oxide, which is separated by filtration. This arrangement, however, as the author of the report admits, leaves a chance of contamination during passage through the open conduit.

The supply for household purposes is constant, including free use of a bath tap, without any meter. Waste of water, however, is severely punished; but we are not told how it is detected. The payment for water is by a water-rate levied by the Corporation, and the daily consumption per head is ·0618 of a cubic mètre, or about 2·06 English cubic feet: so it is given in the report. This is a little over 12½ gallons per head, an amount which gives the idea that the use of bath water can hardly be carried to an extravagant extent in the Danish capital.

From the chapter on Heating and Ventilation we learn that the greater attention paid to this subject in Denmark of late years is largely due to the influence of Krarup, who died in 1875, but left behind him a legacy of enlightened interest in the problems of heating and ventilation, in regard to which he had been previously the only Danish specialist. Owing to the higher price of fuel in Denmark, and the colder climate, it becomes much more necessary there than in England to take the economy of the apparatus into consideration. A "magazine-stove," lighted from the top, is the favourite warming apparatus for dwelling-houses. For larger systems of warming it appears that hot-air furnaces are mostly in use, and the temperature in any apartment is regulated by a "mixing-valve"

* "Denmark: its Medical Organisation, Hygiene, and Demography." Published with Subvention of the Danish Government. Copenhagen: Jul. Gjellerup. 1891.

for mixing a certain proportion of cold air with the hot. We should call this a very objectionable system, but no objections against it are registered by the authors of this portion of the report, Herr Bonnesen and Herr Ramsing. They note, however, that the stove heating in private houses, as well as in the smaller schools, churches, &c., is almost always "without ventilation." With the hot-air system ventilation is generally combined. Our impression from this portion of the report is that there must be room for great improvement in the carrying out of heating and ventilation in Denmark.

The lighting of towns seems in a somewhat transitional state. Electricity has been used to some extent for the lighting of private houses, but nowhere in the public streets; and while gas is largely used for public lighting, a long list of towns is given where the streets are entirely lighted by petroleum lamps. Gas is also less used for lighting in private houses than in most other European countries; where a strong light is wished for, it is obtained by a better petroleum and a more powerful burner; and the report seems to imply that in future gas will be less and less used for lighting and more for cooking and motive power. This, in fact, is now regarded as the future employment of gas in most parts of the world.

The conditions of sewerage and sewage removal are peculiar, as water-closets are not used (the report says "not allowed") except in hospitals, and the night-soil of Copenhagen is removed by means of an obligatory tub-system :—

"The tubs are placed in small detached buildings, with water-tight bottoms, in the yards. In good houses there are also on the different flats so-called 'air-closets' with soil-pail and funnel, constructed so that fluid and solid excreta are tolerably well separated from each other. The soil-pails are emptied in a special tub in the yard-privy. The tubs are, during the night, exchanged for clean tubs and removed in closed vans, and the contents deposited outside the town. The collecting is done by a private company, which has a contract with the municipality, and which is now about to establish removal of the soil by rail from its depôt to different country stations at some distance from the city."

This is rather fearful reading, and we are not surprised to find that it is believed that this tub system will be superseded by water-closets as soon as the intercepting sewers are made. It appears that, owing to the absence of water-closets, and the fact that a strong tide flows through the harbour from time to time, the drainage of the city has been hitherto taken into the harbour, but with the increase of the city this has been found an inconvenience, and a system of intercepting sewers along the coast is to be formed. Why the water-closet system has been tabooed so far, Herr Ambt, the writer of this part of the report, does not say. It is perfectly clear that the prohibition has been found to be a mistake. In regard to the construction of drains there seems to be a very high standard maintained, and we are told that no private drainage is permitted before a drawing of it is submitted and approved by the authorities, who also, by means of special inspectors, supervise its execution and see that the work is done in the best and most reliable manner.

The Copenhagen Building Regulations appear to be rather insufficient, from the indications given in the book. The situation of Copenhagen, hemmed in on the one hand by the Sound, on the other by fortifications, rendered it long ago necessary, as the population increased, to seek for more room in height where it could not be got in horizontal area; and when this failed, building land was created by reclaiming from the sea, "so that buildings might soon be seen where there formerly had been open water." Unfortunately, the material used, "during centuries," for this filling-in was of the worst and most offensive character, and the evils caused by this mode of procedure are evident up to the present day. The first Building Act for Copenhagen dates from 1856, the next important one from 1871; and the provisions of these Acts have tended more and more towards the securing of a certain proportion of open space in connexion with buildings, of somewhere about the same extent as that provided for in the London Building Acts. The latest Act was in 1889. The regulations as to house drainage are described as "few and insufficient," though, from what was said above, it appears that, in spite of this, the execution of the drainage is practically well carried out. A map is added to this chapter of the report, showing the contour levels of Copenhagen and the extent of built-on land which was formerly covered by water. The extent of the latter is rather astonishing, and if all this building area has been obtained in the manner described, viz., by tipping into the water continually all the worst refuse of the city, it is no wonder that we have to read that the evil effect of these operations is not only still felt, but will probably never entirely disappear; a rather sensational sanitary lesson on the text that "the evil that we do lives after us."

THE ADVANCEMENT OF ARCHITECTURE.

BY PROFESSOR AITCHISON, A.R.A.

TRADITIONAL architecture may be said to have come to an end in England when the staircase at Christchurch, Oxford, was done, nearly 300 years ago, and since then the profession has been groping in the dark, not knowing what to do, nor what studies to undertake, so all past architecture from Greek times has in turn been tried. This is perhaps not surprising if we consider that at the time of the Renaissance in Italy, architecture fell into the hands of scholars, goldsmiths, painters, and sculptors, who did a good deal to render its surface interesting and beautiful by proportion, composition, sculpture, and painting, and who meant to make Roman work the foundation of a new style; but not being constructors, they were without the foundation for improvement in a structural art, and could have no sentiment of structural functions. Wren alone was a great constructive genius, and if there had been a long succession of Wrens, something might have come out of it. It is only by putting architecture again on a constructive basis that we can hope to succeed. I am in hopes that the scheme of the Architectural Association, now starting, may help to put the profession in the right way again. There can be no doubt about the requisite course of study in three or four parts of the very complex whole of which architecture consists, and if the Association can firmly base its course on these, it must help the profession forward.

All that architects can do must be done by building, and building consists in putting the materials we have at command in certain positions, and giving them certain forms. The size and shape of these forms depend on statical considerations. Arithmetic, mathematics, and geometry can alone enable us to solve the necessary statical problems; so these elements must first be mastered, to enable us to solve the statical problems that present themselves. Next comes the knowledge of the strengths and capabilities of the materials we have to use. Then comes planning: the mere physical necessities must be met in the plan, including provisions for the superstructure, and, when the structure is complex, it must be conveniently arranged; for the student to make a rough model is the best way of learning this part of architecture, but it can be done by elevations and sections. Elevations in mere building only show the provisions made for due lighting and the height, and sections show the heights and thicknesses of the different parts of the structure; if all this is properly done we have a complete structure fitted for its material wants, but scarcely an architectural one. This structure raises no emotions; it merely satisfies the intelligence that what was wanted has been done.

The very first instinct of the savage, after his utensils or weapons have provided for his necessities, is to make them pleasing to his eye, and he mostly does this by copying some form in nature that pleases him, and that the object can be made to resemble. There is nothing in nature that the architect can directly copy; he can get hints of an outline from the horizon, from woods, landscapes, or mountains; he may see æsthetic devices applied by nature to the structural forms of animals, trees, and plants; he may experience different emotions in the twilight of a grove, in the darkness of a cave, in the over-arching alley, with the spangles of sunlight between the shadows of the leaves, or from the change into brilliant sunshine after the gloom of a forest, and he may apply these lessons to his buildings. Architects have been trying from the earliest days to get gloom or light, mysterious shadows, or chequered shade into their buildings in an appropriate manner, and to clothe æsthetically the necessary forms. As the ages progressed, æsthetic as well as structural laws have been discovered. It would be madness to ignore the labours of our predecessors, and the accumulated knowledge that has come to us, and begin again from the beginning; the only question is, how we are to properly use these materials we have? Before proceeding further we must consider that the desires, needs, and tastes of the present day are not only different from those of times long past, but are different in some degree from those of our immediate predecessors.

Having arranged our plans according to the material needs of the structure, we also want to give the structure the character it should, in our opinion, have for its purpose. This is easy to talk about, but not easy to do; at present it seems to me that this is mostly done by association. A steeple signifies to us a church as a dome once did; a pediment in Classic times was, I fancy, a sign of a temple, hence the disgust at Julius Cæsar having a pediment on his house.

These preliminaries being arranged, statics will give us the shape and proportion of the voids and solids, but it gives them in a crude shape; former buildings have had most of the æsthetic problems that occur solved before, and show us one solution; this we have to improve on. In Greek work, only cross strain and direct stress is found, but we see how these have been treated; we see how the superincumbent weight has been carried on to the piers and columns. We also see the various æsthetic methods employed to mark a change of function, and the communication of the stresses to the bearing members below. Different forms of parts were not originally made to show a change of function; what are now columns were originally tree trunks, and were consequently round, and when stone columns supplied their place, they were made round too, from imitation and religious conservatism, and their flutes were an æsthetic device to contrast with the horizontal lines above. The cap was the ordinary carpenter's device for shortening the bearing of the lintel; the abacus or upper part was originally left square, and the lower part was moulded into an echinus or cut into rude volutes merely to improve its appearance. In these outside æsthetic devices there were three factors,—the climate, the taste and invention of the architect, or more probably those of a long succession of architects, and the national taste, for any invention that was not liked was not continued.

More complex æsthetic considerations are involved in the domes, barrel, and groined vaults of the Romans and Byzantines, inside or outside buttresses being required to counteract the thrusts. Difference of climate and of taste have called forth different æsthetic devices in Saracenic, Romanesque, and Mediæval architecture. One striking device of the last is, perhaps, as much an intellectual as an æsthetic device, I mean surrounding the main column with smaller ones, so that the weight of each particular part might appear to be brought down and carried on its own shaft; some took the cross and diagonal

ribs of the nave vault, others of the aisle vault, and the rest the side arches of the nave. All the architect can do, after the plan or general scheme is settled, is to shape, to mould, and to pierce the various parts, and he may call in the sculptor and the painter to enrich important parts with carving and colour.

Archæology gives us the dates of different structures; it is an interesting philosophical study, enabling us to judge of the degree of knowledge, skill, and taste existing when the building was built, but if it takes the place of architecture it is fatal to it. It begs the question, it virtually says all that can be known and done was done by the Greeks, the Romans, the Byzantines, the Saracens, the barbarians of the west, or the semi-barbarians of the middle ages, and we have nothing more to do than to adapt their work to our particular wants; but I deny that this is the case. In each succeeding architectural epoch that had vitality, the previously acquired knowledge had been utilised, and from this point fresh advances were made; if the Romans had been content with Greek architecture they would not have adopted the vault and the dome. We can trace in the Roman remains left to us the efforts made to meet the new wants of the day. The Mediævals started from the Romanesque, and with the knowledge they had acquired from the Byzantines and Saracens pushed on architecture still further, and never ceased from doing so until the style died out.

The engineers have shown us what marvellous feats may be done with our statical knowledge and our new material iron, which none of us as yet have been able to bring within the pale of architecture.

We can get the proportions of buildings that have impressed us,—for instance, the inside of the Pantheon at Rome, of Sta. Sophia at Constantinople, of St. Mark's at Venice; we can see the effect of the lighting, and more or less solve why these buildings have succeeded in impressing us with sublimity, vastness, stability, or beauty, and, in fact, we can do the same by every building or part that has produced on us any marked emotion.

Let us take a series of Greek mouldings, for example, and see where it was to be placed, and what effect it produces on us, and try and find out what effect the architect desired to produce. Athens has a pellucid atmosphere, with a brilliant and blinding sunshine, and we shall find every possible device used to get gradation and varied shapes of shadow, and to interpenetrate shades with the gold of reflected light. Our climate is the very reverse of that of Athens,—it is misty, and in large towns there is very little sunshine, and vast quantities of smoke, soot, and dust. The Mediæval mouldings of England were designed for the climate, but by architects with very rudimentary æsthetic taste; still we can see that they aimed at producing certain effects,—it is for us to see how the rough lessons they teach us can be improved on.

Viollet-le-Duc says moulding is architecture, and it is almost all that architects can do, when the general form has been adopted and statics have settled the shapes of the parts; yet is any student ever taught to analyse mouldings, and to see how he would try and produce the effect he wants? All he is asked is the style and date of the mouldings shown him, which is absolutely of no value to the architect.

Let me say that one test of a good building is that it will worthily enshrine the best sculpture and painting of the day, and be in harmony with it. The pierced Chinese ivory balls attract our attention for an instant, and we say "How very ingenious!" and "What patience the carver must have had!" But it is only children and uneducated persons that are delighted with them. Persons of taste are delighted with a curve, a scroll, or a leaf done off-hand by an artist, half of whose life has been spent in acquiring the taste and mastery of hand and eye that will enable him to do it. He gives us, as it were, the very essence of grace distilled from the animal or vegetable kingdom, and fitted to adorn the architectural member it is placed on.

What we want is easily said: daring construction, fitness for the purpose both material and mental, and mostly with the necessary dignity, simplicity, and grace; but to do this requires extraordinary ability, the hardest study of many dissimilar subjects, and ceaseless effort. We also want grand public monuments, of structural difficulty, intended to be permanent, and to produce high and noble emotions, to form a worthy school of architecture; buildings purely for material needs, of simple construction, and especially if built only to last the time of the lease, will never produce fine architecture; but I do not include in these private houses to suit the special requirements of the owner, architecturally expressed.

Let us take, for example, the Roman baths. The early ones were mere washing-places, and the mere act of washing or cleaning oneself is hardly calculated to raise an emotion, and the proper expression of a mere material need does not make architecture; but the later ones combined with this act, everything that could invigorate, delight, or instruct mankind: there were gymnasiums, palæstras, shady walks, flowers, plashing fountains, perfumes, and gorgeous dresses, vast halls, decorations, paintings, and sculpture; poetry, oratory, music, singing, and science were provided there,—everything, in fact, that could intoxicate the senses and enthral the mind, and the whole naturally became an architectural structure.

I fear I have not made my meaning quite clear. Houses properly built for the special wants of particular owners, where those wants have been architecturally expressed, are valuable records of architectural skill and good examples to be improved on; but even these are unlikely to lead to a noble monumental architecture.

As far as I am able to judge, monumental excellence has only been achieved when the buildings have represented the highest aspirations of the race in some particular direction, mostly religious; have been of great size, consequently involving difficult constructive problems; have required the highest æsthetic skill to express the aspirations, and have persisted through a long succession of epochs; and mostly have had some definite structural difficulty to overcome. In Greece, these monuments were temples. In Roman times I think they were baths, for, not to speak of private baths, many of which were of great splendour, there was a succession of magnificent public baths, from the days of Augustus to Constantine.

These baths were difficult to plan, as so many different wants had to be provided for; each part had to be large on account of the concourse of people, and all the vast chambers had to be vaulted or domed.

In Byzantine and Mediæval days, the problem was to build cathedrals and grand churches. In the former, the support and abutment of a great central dome was the main constructive problem; in the latter, to vault the nave, to build a central tower and lofty steeples; and, in both, to fit the structure for the last change of ritual, and for the last development of artistic decoration,—mosaic in the first, and stained-glass in the latter.

The great difficulties to be overcome were worthy of the ambition of great men: their names were in the mouths of their generation, and their fame was enshrined in the edifice. They were at the head of a vast school, and left trained successors for the next cathedral; without this opportunity we cannot expect to rival our predecessors.

Religion has been the motive for the erection of nearly all the masterpieces of the world, and will be again.

Public Park for Accrington.—The Accrington Town Council decided, on the 5th inst., to purchase Oak Hill estate for a public park, for about 9,500*l*. Oak Hill was formerly the residence of the Hargreaves family, and the grounds, thirteen acres in extent, are well timbered.

THE FRENCH ARCHÆOLOGICAL SCHOOL AT ATHENS: EXCAVATIONS AT DELPHI.

When it became known that the Greek Government had ceded to France the right to excavate at Delphi, it cannot be said that the general enthusiasm among the archæologists of other nations was very great. The French School at Athens has for a long time been socially somewhat under a cloud. Germany took the lead with marked political as well as scientific prestige, England and America cheerfully followed, but France held herself aloof in somewhat haughty seclusion. To individual archæologists,—as the present writer can abundantly testify,—the French Director was always not only courteous, but genial and friendly; but from the corporate archæological life of Athens, from the lectures and meetings of other schools, Director and students stood apart. Indeed, so unsocial were they, that the very *séances* of the school itself ceased in 1878, two years after its foundation by M. A. Dumont.

The new director is M. Homolle, already well known in connection with the excavations at Delos, and his inaugural address at the first of the re-opened *séances* of the School is of great public interest, as marking a new epoch in the whole policy of the institution. The cloud is to be lifted,—difficulties, personal and political, set aside,—and the social life of the School begins again. M. Homolle, we are glad to see, does full justice to the excellent work carried on by his predecessor. The excavations made at Delos, Acræphiæ, Mantinea, Myrina, Elatea, which have so abundantly enriched both the Louvre and the National Museum at Athens, show clearly that the School was doing good, if somewhat secluded work.

Year by year was issued a thick volume of the "Bulletin," mainly devoted to the publication of inscriptions and terra-cottas. The "Bulletin" M. Homolle hopes ultimately to enlarge by the addition of a supplementary issue of large-sized plates; for the present, the last number is marked by a supplement, much needed, of notes and news that puts it at once in touch with the doings of the rest of the archæological world. M. Homolle invites the co-operation of all his colleagues in the following, for the French School, most significant words: "La collaboration constante, l'entente cordiale, ne peuvent manquer de produire les meilleurs fruits; elles écarteront la possibilité de tout froissement, éviteront les recherches parallèles et concurrentes, permettant d'introduire dans les travaux plus de méthode et d'unité. Ce résultat suffirait à lui seul à recommander nos séances." It is pleasant to hear the Director of the French School speak of the Archæological Institute at Berlin as a model for its efforts, and point the moral by such words as these:—"La science est faite pour rapprocher et unir, elle ne connait pas de haine, elle exclut toute pensée de rivalité." Are we on the eve of an archæological millennium?

Be this as it may, all this peace and goodwill is particularly timely. No one will grudge Delphi to the French if they will not grudge it to the rest of the world. And we shall not now have long to wait to prove these new professions. Thanks largely to the energy and courtesy of M. le Comte de Montholon, the French Chambers have voted the necessary sum. The Greek Government it now at work clearing away the village of Castri, and the ground will be free before the winter. Early spring should see the spade well in. Already, in trenching round the limits of the field of excavations, an archaic female statue has been found, interesting, because it is just the same type as those found in the Acropolis at Athens and at Eleusis and Delphi. This is of good augury. M. Homolle's inaugural address appears in full in the last issue of the "Bulletin de Correspondance Hellénique" (1891, iii. iv.), just published.

NOTES.

THE announcement of a definite date, only a few months hence, when the broad-gauge traffic of the Great Western Railway will cease to exist, cannot but be regarded with rather melancholy feelings by those who are interested in railway work and railway possibilities, and who have appreciated the splendid travelling which was made by the fast trains on the broad-gauge rails. We observed a remark in a daily paper to the effect that it had been long shown that all could be done on the narrow-gauge that was promised on the broad-gauge, and therefore the latter had no longer any *raison d'être*. The writer of such a remark must have paid very little attention to the difference in fast travelling between broad and narrow gauge trains. The latter now attain as high speeds as the broad-gauge, but the difference in steadiness and smoothness of locomotion is very great. In a broad-gauge train travelling at sixty miles an hour one was not conscious of the high speed, so much less was the shaking and oscillation than with the narrow-gauge. Brunel's great error, of course, was a want of foresight as to the future of railway travelling, and the necessity that must ultimately arise for all great lines to have a uniform gauge and a power of passing traffic from one system to another without unloading. It may be added that in an economic sense his gauge erred in excess of size, demanding heavier engines and carriages and a greater consequent wear and tear on the road than the additional carrying power compensated for. On the other hand, there can be no doubt that the ordinary gauge is too narrow for the best possible results in railway travelling. A 6-ft. gauge would probably have been a good medium. But Brunel must always have the credit of having desired to construct a railway on the conditions most favourable to safe and comfortable rapid travelling, instead of merely accepting a gauge fixed by chance and previous circumstances. The ultimate collapse of the broad-gauge system, under all the circumstances, was long seen to be inevitable; but let us shed a tear over its grave. We shall never again have such railway travelling as with its fast expresses.

THE directors of the railway companies have been taking advantage of the opportunity afforded them by the half-yearly meetings of stating their views on the rates question. The Great Western chairman approached the subject in a highly indignant spirit, declaring that the railway companies had not been accorded anything like justice by the House of Commons, the latter "caring no more for the enormous amounts of revenue and expenditure belonging to the railway interest than could be indicated by a snap of the fingers." Lord Stalbridge, also, considers the result of the inquiry to be unsatisfactory, stating that the Bills give the railway companies the smallest possible margin for working the traffic. Certainly the net result of the proceedings has been to curtail the charging powers proposed by the companies themselves to a considerable extent, but not without good cause; and if, as was repeatedly stated, a large proportion of the rates actually in operation are below the class rates, the "elasticity" which Lord Stalbridge complains the companies have been deprived of may be found in this direction. The London and North-Western have been placed in the forefront of the battle, and it is estimated that the Bill has cost that company no less than 35,000*l.*; while, as Lord Stalbridge remarked, they have still to readjust and re-write all their rate-books. The number of rates in operation on this line alone is said to be from 18,000,000 to 20,000,000, and those of the other companies vary in proportion with the number of stations open, and the amount of competition entailing special rates. Mr. Paget told the Midland shareholders that the loss of revenue involved in the necessary alterations of their rates would not be so serious as at one time seemed probable; and Lord Colville of Culross (Great Northern), while admitting that it is at present impossible to state what will be the ultimate effect of the Provisional Orders, expressed a hope that the question has been set at rest for years to come. We are afraid that this is rather too much to expect, for, although most of those concerned have had more than enough of it, there is still much discontent on both sides with some of the decisions arrived at. A letter has been circulated among the timber-traders, for instance, urging the formation of a central association of the timber trade, in which it is remarked that the operations of the trade generally have been hampered in the Provisional Orders. It is regarded as essential that an effort should be made to recall the Parliamentary decision at the earliest possible date of the next Session, and before the operation of the Act in August, 1892, "by a motion for the appointment of a new Committee, or by the introduction of a Bill." It may be safely asserted that it will be a long while before another Committee is appointed to consider the question of railway charges, unless exceptional circumstances should arise rendering the new arrangements unworkable; but the timber-traders are not the only dissatisfied parties, and some amount of friction appears inevitable.

IT is good news that the excavations at Epidaurus have been begun again. M. Kabbadias, now that he has finished the Acropolis at Athens, has returned to Epidaurus, and will there apply the same exhaustive method, we may hope, with the like success. The whole precinct of Æsculapius is to be thoroughly dug out at the cost of the Archæological Society at Athens, which, it will be remembered, bore the expense of the previous excavations brought to a close in 1885. Already the peristyle of a monument of Doric style, and an Odeon of Roman date, have been found, and no doubt many another detail of the plan of the precinct will soon be filled in. As soon as the excavations are completed, the results are to be published in a joint work issued by Drs. Dörpfeld and Kawerau, which will include the sculptures found, the hitherto-unpublished inscriptions, and abundant plans and restorations in connexion with the cult of Æsculapius. The investigations of M. Legrand, of the French School, at Troezene, are of considerable interest. He has settled several topographical points,—such as the site of the temple of Apollo Thearios, and of the sanctuary of Hippolytos; he has found several archaic inscriptions,—one of them an oracle relating to the cult of Æsculapius and sacred therapeutic rites, also a statue of Hermes of considerable artistic merit.

M. HOMOLLE, to whose inaugural address at the French School at Athens we have elsewhere drawn attention, was the fortunate discoverer of the basis signed by the sculptor Bryaxis, found in the excavations made owing to the extension of the Piræus railway. The sculptures which decorate the sides of the basis are to be published shortly, but M. Homolle gives a full account of their style and significance in the present issue of the "Bulletin de Correspondance Hellénique." He found the basis standing *in situ* near the Theseus street. It is 0·32 mètres high, by 0·75 mètres broad. Three faces are sculptured; the fourth bears the inscription,—four lines of dedication, the fifth being the sculptor's signature, the only one by Bryaxis we possess. The three sides are sculptured in very low relief, and the subject of all three is identical; a mounted horseman rides up at full gallop to a large tripod as high as himself. These three horsemen are the three phylarchs who dedicate the monument. They wear short chitons and chlamys; they wear no cap or helmet, and carry no arms. Mr. Homolle thinks we have here a representation of the ἀνθιππασία as described by Xenophon (Hipparch. III., 10). The characters of the inscription correspond with the date of Bryaxis, who, it will be remembered, was one of the sculptors to whom the decoration of the Mausoleum was entrusted (B.C. 350); and the comparison of the newly-discovered sculptures with those that decorate the frieze of the Mausoleum will be of considerable interest. They are reported as generally analogous in style. It is, of course, quite possible that Bryaxis made only the statue, or whatever the basis supported, and that these subordinate decorative sculptures were executed by some inferior artist.

LORD MEATH, the Chairman of the Metropolitan Public Gardens Association, has again, and very properly, raised the question of the opening of the garden of Lincoln's Inn-fields, if not to the public at large, at any rate after the manner of the Temple and Lincoln's Inn-gardens, and at stated times, for the children of the neighbourhood. The trustees have, of course, refused the request, though the Association offered to defray the cost for three years. But there is a significant sentence in the reply of the trustees' secretary. He says that if children were admitted in the evening it would interfere with the enjoyment of the gardens by the owners and occupiers of the neighbouring houses, and other "respectable" persons who now pay an entrance fee. It is clear, therefore, that the trustees are quite willing to make money out of the gardens, though they are not charitable enough to give permission to the poorer classes. Again, it would be interesting if Mr. Upton were to furnish some statistics of the number of "respectable" persons by whom the gardens are now used. To the naked eye, at any period of the day, they are invisible, and the suggestion that the gardens are really used by the owners of the adjoining houses seems to be inaccurate. Some day, these virtuous trustees will probably start a scheme to cover these gardens with buildings. For the present, the talk about the gardens being used by the occupiers of the adjoining houses will not impose upon anyone. Meanwhile, why should not two seats be placed by the drinking-fountain outside of, and at the north-west end of, the gardens? There is space, and the trustees cannot take pleasure in seeing mothers and children sitting on the pavement, as is now often the case.

THE new number of the *Revue Générale de l'Architecture* contains a valuable article by M. Dieulafoy, the third of a series, on "L'Art Décoratif dans l'Ancien Orient." The illustrations fully sustain the high reputation of the *Revue* in this respect. They include a perspective view and a beautifully-executed detail drawing of a very classical building for the Art Museum at Laval (Mayenne), with plans, a fine drawing of the sixteenth-century gateway of the Hôtel Felzins, at Toulouse, and another of a Louis XVI. balcony from Bordeaux.

TWO terra-cotta figures, 10 ft. high, formerly at Arundel Castle, have been presented by Mr. Edgley to Lambeth Vestry, and, we gather, will be placed upon the Albert Embankment. They were burned at Coade's "artificial stone" factory in 1798, and if, as is said to be the case, they were modelled by Bacon the elder, sculptor, must be amongst his latest work, for he died in the following year. Mrs. Coade began business at Lyme Regis in 1769. The works were removed thence to King's Arms-stairs, Narrow-wall, Lambeth, and there flourished for some sixty years. The alto-relievo of the death of Nelson, in the eastern pediment, with the four statues in the chapel vestibule of Greenwich Hospital, designed by West and executed by Panzetta and Bacon, as also a rood-screen for St. George's Chapel, Windsor, were made of the artificial stone. In or about 1827, Messrs. Croggan & Co. succeeded to the business, and removed to the then

New-road, next the site of Tottenham-court,* where it latterly passed to Messrs. Austin & Seeley. On the front of Messrs. Smart & Co.'s fringe and upholstery workshops, within 100 yards of the end of Hampstead-road, may still be found the original bas-relief, a mythological composition (or a replica of it), that distinguished the factory at Lambeth. That bas-relief is now partly hidden from view by two shops, Nos. 268 and 270, Euston-road, which have been built on the fore-court. This site, together with Mundy's-yard, at the back, in Euston-road, is at present to be let for building purposes.

IN a letter printed in the *Times* last week, Mr. F. J. Chambers, architect, directed attention to the finding of a tunnel in a yard next to East Paul's Wharf, Upper Thames-street. The tunnel is of brick, is 14 ft. wide, and has a clear way of about 8 ft., after allowing for a deep deposit of mud along the floor,—the mud having all the appearance of a river-bed. The crown of the arch is about 8 ft. below the roadway; the tunnel lies north and south towards the site of St. Peter's Church, for a distance of 110 ft., starting from a point 50 ft. distant from the Thames, and is closed with later brickwork at each end. The arch, within, is covered with stalactites, in some cases a yard long. Of an old dwelling-house at the end of the yard one portion stands over this vault, the other upon the river wall. Mr. Chambers tells us that the house is said to be 300 years old, and to have been occupied by James I., the adjoining old wharf, still standing, being used as barracks for his soldiers. By the occupant's courtesy, we have been over the house; and, setting aside the Great Fire, do not think it is so old as alleged. It is, however, one of the last of its kind on Thames bank, and may have been built 200 years ago. It is a comfortable place, contains nineteen rooms, has two staircases, and a projecting front to the first floor (river side), with verandah above. It bears evident signs of having served as a warehouse, has a strong-room, with two massive iron doors, and is now let in apartments. An open area, formerly bridged across, divides the front and back portions from over the first floor upwards. It rests upon big oaken beams laid across the descent to the river wall, and is numbered 25, Paul's Wharf. Next westwards stands "the barracks," a large warehouse nine floors high, with a return, capped with twelve gables, alongside of the way to Paul's Pier. Next eastwards stood an equally old warehouse, rebuilt last year under, as we understand, Mr. Chambers's superintendence. The tunnel may possibly have been made to carry off some of the torrents that used to run down the steep inclines in this part of the town after great and sudden rains, sometimes to the peril of human life, as witness the story told by Stow *à propos* of Dowgate (1574). Stow, indeed, who is seldom at a loss for a derivation, says that Downegate is so called from the sudden going down of that way from St. John's Church upon Walbrooke, which is as likely as his derivation of Puddledock, by Blackfriars. Allen, in his "History of London," gives an account of the mansions or palaces that once stood at this end of Upper Thames-street. Between Baynard's Castle and Paul's Wharf were the house of the Scroop family, and the inn of the Abbot of Fiscamp, given by Edward III. to Sir S. Burley, Knt. Opposite to St. Peter's-hill,—and just northwards of the tunnel we speak of,—stood Beaumont's Inn, afterwards known as Huntingdon House, *temp.* Edward III.; and close by was Le Neve Inn, which formerly belonged to John de Mountague, Earl of Salisbury, next to Sir John de Beauchamp, Knt., and subsequently to Thomas Erpingham, Warden of the Cinque Ports, K.G. At one time the western portion of Thames-street, *olim* Stockfishmonger-row, was as favourite a locality with the wealthy as was the Strand. The Earl of Pembroke lived here in the reign of Mary and Philip; he agreed with the Common Council for the removal of a noisome laystall adjoining his house, he giving in return "2,000 ft. of hard stone to make the vault and wharf thereof, or else forty markes in ready money to buy the same stone withall" (Stow). The inn of Okeburn Priory, Wilts,—given by Henry VI. to King's College, Cambridge,—was in Castle-lane. The discovery of the tunnel will, perhaps, revive some of the silly stories about underground passages in various directions in London.

* *Vide* Brayley's "Surrey," vol. iii. (1841).

IN the last number of *L'Architecture*, M. Guadet, in an article on "Le Salon d'Architecture," in reference to some of the elaborate restorations of Mediæval châteaux which figured among the Salon exhibits, gives an amusing parallel or contrast, in double columns, between the provisions of a Mediæval château and a modern country house. We extract some of M. Guadet's contrasts:—

"Année 1391. *Le castel d'un haut et puissant seigneur.*	Année 1891. *Le château d'un riche particulier.*
Cette construction sera élevée sur un rocher abrupt et aussi inaccessible que possible.	Cette construction sera élevée sur un terrain en pente douce près d'une grande ligne de chemin de fer.
On y arrivera par un chemin détourné, découvert, coupé de chausses-trappes et de trous de loup, hérissé de chevaux de frise.	On y accèdera par une large avenue de grands arbres, bordée de pelouses et facilement carrossable.
* * *	* * *
En outre des défenses nécessaires telles que tours, herses, etc., on y trouvera:	En outre des larges accès nécessaires, tels que vestibules, escaliers, etc., on y trouvera:
Une salle de famille et quelques pièces d'habitation, prenant le moins possible de l'espace nécessaire à la défense.	Un appartement complet de réception et plusieurs appartements d'habitation.
La conserve des goudrons, étoupes, pots à feu, etc.	Une bibliothèque.
Plusieurs cachots.	Plusieurs boudoirs.
La chambre des tortures, questions, estrapades, etc.	Une salle de bains, hydrothérapie, avec lits de repos, etc.
Les oubliettes en nombre suffisant.	Nombreuses chambres d'amis.
Au lieu le plus élevé, un gibet pouvant être aperçu de loin.	Au lieu le plus élevé un belvédère permettant de voir au loin.
Cours, réduits, poternes, redoutes, bastions, saillants, parapets, palissades, chemins de ronde, etc., etc.	W. C.
On devra prévoir une vaste conserve d'eau pour plusieurs mois, sous le donjon.	Il y aura des fontaines jaillissantes, vasques, effets d'eau et cascades.
Toutes les fenêtres ouvriront sur les cours intérieures; les murs de façades ne devant être percés que de meurtrières, embrasures et créneaux.	On évitera les cours fermées; les façades seront largement ouvertes pour permettre de jouir en tous sens de la vue des environs."

"Ah! the good old times!" adds M. Guadet; "it gives one a cold shiver down the back even to think of them."

THE EDINBURGH CONGRESS OF THE ROYAL ARCHÆOLOGICAL INSTITUTE.

THE inaugural meeting of this year's Congress of the Royal Archæological Institute of Great Britain and Ireland took place on Tuesday, the 11th inst., in the Lecture-hall of the Scottish National Portrait Gallery.

Sir Herbert E. Maxwell, the President of the Congress, on taking the chair, formally welcomed the Institute to the Scottish capital. He said that the closing years of the century naturally suggested stock-taking in archæology. Comparing the present day with a century ago, there was a half-way landmark, the last meeting of the Institute in Edinburgh. Sir Herbert drew an interesting comparison between Walpole and Scott, who were somewhat similar in their tastes. Each had built a Gothic palace at a time when architects were almost ignorant of that branch of their art. Each was an author; each an ardent collectors. Yet there were marked differences between them. Walpole collected antiquities because of their beauty; Scott on account of the associations connected with them. Each was pre-eminent in his day: Scott as an antiquary, Walpole as a dilettante. It was the duty of the modern archæologist to follow a higher aim than either Scott or Walpole, namely, the attainment of the truth. The Scottish antiquaries had brought together in their new buildings a collection from which it was their desire to know and understand the past history of their race, without which it was impossible to understand the present, or forecast the future. With regard to the study of archæology, he considered it the handmaid of history, and an important branch of the great science of anthropology, the study of mankind. Collectors he described as of two kinds, the "bottlers," and the "good collectors." The former kept antiquities entirely for their own satisfaction; the latter, for the public good and advancement of science. He strongly advised all collectors, whether good or "bottlers," to label every object immediately on finding it. Sir Herbert referred to the importance of tradition. It was an unsafe guide, but should not be entirely despised. He thought scientific people should examine them well, retain what was true, and reject what was false. He concluded his address by alluding to the munificent generosity of Mr. John Ritchie Findlay, who had, at his own cost, erected the building in which they were then assembled, and which was now the home of the Scottish National Portrait Gallery and of the Museum of the Society of Antiquaries of Scotland.

Among the distinguished archæologists present at the meeting were Earl Percy, Mr. Robert Munro, the Rev. Sir Talbot Baker, the Bishop of Barrow-in-Furness, Mr. John Evans, Mr. T. Hodgkin, Mr. Cadwallader, Mr. J. Bates, Mr. T. H. Baylis, Q.C., Professor E. C. Clark, Mr. William Jolly, Mr. James Hilton, Mr. John Honeyman (President of the Glasgow Archæological Society), Chancellor Ferguson, Mr. Albert Hartshorne, Mr. Gilbert Goudie, Mr. H. J. Blanc, Mr. J. T. Micklethwaite, and others.

In the afternoon the archæologists visited Holyrood Palace. Mr. W. W. Robertson, of H.M. Office of Works, met the party in front of the palace, and conducted them over the place. The buildings consist of three portions, viz., (1) the nave of the abbey church, now in ruins, of the latter half of the twelfth century; (2) the old palace, commenced by James IV., and forming the north-west tower of the present façade. Mr. Robertson said that this portion of the building was commonly attributed to James V., but he did not agree with this supposition; and (3) the new palace, built by Charles II. The abbey was founded by David I., who dedicated it to the Holy Rood. According to tradition, when St. Margaret arrived in Scotland she brought with her a relic of the Holy Cross, and bequeathed it to her son. The relic was kept at the abbey as a precious treasure, and remained there till Edward I. got possession of it and took it away to England. It was, however, subsequently restored to the abbey.

By permission of Her Majesty the Queen the members of the Institute were permitted to inspect the royal apartments, which are not usually shown to the public.

Wednesday, the 12th inst., was devoted to Linlithgow and Stirling. Unfortunately, the weather was far from pleasant in the morning. Storms of wind and driving rain did their best to damp the ardour of the archæologists, but in spite of these disadvantages, the programme was strictly adhered to. On arriving at Linlithgow Station, Mr. Thomas Ross, of Edinburgh, took the party in hand, and first conducted them to the spot where the Regent Moray was shot by Hamilton of Bothwellhaugh, then to the Church of St. Michael. Like most other churches dedicated to the great Archangel, it is built on a hill. Before entering the building an interesting old gateway was passed. Over the archway are shields emblazoned with the insignia of the four great orders: (1) Garter, (2) Thistle, (3) Golden Fleece, and lastly St. Michael. This gateway owes its origin to James V. The church is cruciform in plan, with north and south aisles extending the whole length of the building, a western tower, and chancel ending in an apse. On the south-east angle of the church is a figure of St. Michael. Mr. MacGibbon, in his paper on this church, published in the Institute Hand-book, remarks that "Scottish architecture, both military and ecclesiastical, was almost identical with that of England up to the time of Edward I., but after the War of Independence it followed a distinct course of its own, both as regards churches and castles." Many of the windows show a decided

Flamboyant feeling in their tracery, so rarely to be found in England.

Attention was called to the circular-headed windows of the clearstory, and the members of the Institute were reminded that the round arch in Scotland was no criterion of date, as it was used in all styles of architecture down to the end of the Gothic era.

From the Palace a magnificent view is obtained over the surrounding country, with the charming little "loch" in the foreground. The present building was commenced by James I. of Scotland. James V. appears to have made extensive alterations and additions to the Palace. A new entrance was made in his reign on the south side. The original entrance is still to be seen on the east side, high above the outside ground-level. It is a round-headed archway with square panel over, containing three shields, the centre one bearing the Royal Arms of Scotland. At each side of the panel is a long slit or opening to contain the apparatus for lowering the drawbridge. Over the gateway in the interior are three niches, which formerly had statues emblematic of the Pope, the Lords, and the Commons. In the centre of the courtyard is an elaborate fountain of the time of James V., octagonal in shape, with a small pillar at each corner. In the centre is a shaft surmounted by a crown, on the underside of which is a representation of the sun.

Stirling was reached about two o'clock. After the archæologists had refreshed themselves with a luncheon at the "Golden Lion Hotel," they at once proceeded to the parish church, which was described by Mr. G. Washington Brown. The building is known as the East and West Churches, being divided into two "charges" or cures. The partition wall between the two portions was erected in 1656. The church was dedicated to the Holy Cross. Possibly this fact may account for the frequent occurrence on the stones of the nave of five small circles, so arranged as to form a cross. The nave dates from the fifteenth century, and is consequently older than the chancel, which was erected in the early part of the next century. Being higher than the nave, it has one interesting feature, namely, a vesica-shaped window, looking over the nave roof. Mr. Thomas Ross conducted the archæologists over Stirling Castle and Palace. It was considered one of the most important fortresses in Scotland. The exterior of the palace is probably the earliest example in Scotland of a building with Renaissance work.

The morning of Thursday, the 13th inst., was given up to the reading of papers. In the afternoon the members assembled at St. Giles's Cathedral, and at once proceeded to inspect this magnificent church, under the direction of Mr. George Henderson. The building is too well known to require any description here. Perhaps, however, it may be well to draw attention to the crown-shaped spire; that, we believe, is a peculiarity of the northern portion of this country. Another instance occurs at Newcastle, and there were similar structures formerly at Linlithgow and St. Andrews. The Cathedral is not improved by the dark-coloured stained glass with which most of the windows are filled. Little or no taste seems to have been expended in this particular. Far better would it have been to have left the windows with plain glass than to have expended money in darkening the building. The same remark applies to Glasgow Cathedral, where the light in the under-church is positively obscured, and the building can only be inspected with the aid of artificial light.

The Parliament House, with its adjacent buildings, the Libraries of the Faculty of Advocates and of the Writers to H. M. Signet, were described to the meeting by Mr. James Balfour Paul, Lyon King of Arms. The ground on which some of the buildings now stand was formerly a burial-ground attached to the Cathedral of St. Giles. The last interment which took place there was probably that of John Knox, who died in 1572. The stone façade of the Parliament House masks the ancient building, which was in style like a Scotch baronial mansion, with projecting turrets at the corners. It may have been a picturesque building, but little can be said in favour of the present structure. The great hall was in former times the meeting-place of the Parliament. It is certainly a magnificent building. Here in the olden times sat the Lords and Commons in one chamber. It is 120 ft. long by 40 ft. broad. The roof was much admired by the visitors, but was generally considered rather too heavy for the height of the hall.

The castle was next visited, Mr. Hippolyte J. Blanc acting as guide. Naturally, the greatest interest was manifested in St. Margaret's Chapel. Mr. Blanc informs us, in his paper on the castle, that "the precise date of the erection of the chapel is not known, but as Queen Margaret's Oratory it must have been built before her death in 1093. It is therefore the oldest complete ecclesiastical edifice of expressed character in the northern parts of our islands." Proceeding to give a short historical sketch of the castle, Mr. Blanc said that the early history of the castle was, in reality, the history of the ancient city. Suffice it to say here that Malcolm Canmore, the husband of St. Margaret, turned it into a Royal residence. A general feeling was expressed that the unsightly modern buildings should either be improved off the face of the earth, or so altered, if possible, as to harmonise with the old and venerable pile.

Leaving the castle the party walked down Castle Hill, where several places of interest were pointed out by Mr. Gilbert Goudie, the treasurer of the Society of Antiquaries of Scotland, and well known to Scandinavian archæologists as the translator of the "Orkneyinga Saga." One of the oldest houses in Edinburgh was visited by the members of the Institute. It has lately been restored by Professor Giddes, and is situate in one of the many courts or "closes" in the old town. The learned professor pointed out how these interesting old mansions could be repaired without detriment to the ancient work or being pulled down, as is too often the case. He informed the party he had a scheme on hand for treating other houses in a like manner, and we heartily trust he will be successful in his endeavours to preserve for future generations some of the most interesting features in old Edinburgh. A visit to George Heriot's hospital brought the examination of the old town to a close.

In the evening a conversazione was given by the President and Council of the Society of the Antiquaries of Scotland in the Scottish National Portrait Gallery. The Marquess of Lothian presided, and formally declared the museum of antiquities open. Not the least attractive feature of the evening were the Highland pipers, who marched up and down the central hall playing national airs. Some of the foreign visitors were much impressed, and perhaps amused, at their costume and harsh-sounding music. The reception was eminently successful, and we understand that the members of the Institute are greatly indebted to Dr. Robert Munro for procuring so large an attendance of Edinburgh people at this dull season of the year. It was entirely owing to his zeal and energy that many a worthy Scot returned to the Scottish metropolis to be present at the ceremony.

[We will continue our report of the Congress in our next.]

ARCHITECTURAL ASSOCIATION:

TWENTY-SECOND ANNUAL EXCURSION.

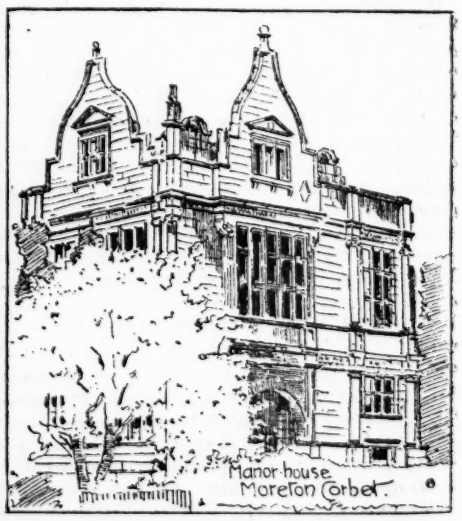
CONTINUING our notes from last week (see p. 116, *ante*), we now give an account of the remaining portion of the excursion.

Wednesday, August 12.

The first place visited on this day was Albright Hussey, a picturesque half-timber house, with a moat around it, now occupied as a farm-house. Originally a manor-house, owned at the time of the Domesday Survey by the Rainald whom we have already noted as holding Wroxeter, it would appear that it subsequently became what is more properly called a grange; for we find that the first tenant, bearing the name of Hussey, between 1160 and 1165, made a grant of land, including this manor, to the Abbey of Lilleshall. Before the time of this man, Walter de Hose, or Walter Hosatus, as he is sometime styled, the name of the place was Albrighton. In ancient times Albright Hussey formed part of the parish of St. Mary, Shrewsbury, and in 1173 Ralph Husey compounded with the Dean and Chapter of St. Mary's for their parochial jurisdiction over the chapel of Albright Hussey, by securing to them a pension, apparently of four shillings, for 100 years. The exact position of the estate, however, seems to have been a matter of dispute, for between 1200 and 1210, one Jacobus Clericus, the incumbent of the Chapel of Albright Hussey, had a quarrel with the Abbot and monastery of Lilleshall about tithes and other church income, which being referred to the Pope, he appointed Huehed, Abbot of Buildwas, Ralph, Abbot of Haughmond, and Roger, Prior of Wombridge, as arbitrators, when a compromise appears to have been arranged. A fragment of the chapel still remains in the farmyard, apparently of about the date of the grant to Lilleshall Abbey; but the greatest attraction is to be found in the house, which contains some excellent panelled rooms, and a good Late chimney-piece, besides several interesting bits of detail in hinges, latches, and other finishings. A short walk across the fields brought the visitors to the church of Battlefield, which, in later times, obtained an interest in Albright Hussey, for in 1535 the collegiate church of Battlefield was receiving twenty shillings yearly for the "ferm" of the chapel of Albrighton Hussey. The name Battlefield points out that this was the site of the great Battle of Shrewsbury, fought on July 21, 1403, between Henry IV. and the Percies. In commemoration of his victory, the king founded here a collegiate church about the year 1410. This has been very thoroughly "restored," or, rather almost rebuilt, with the exception of the tower, under the direction of the late Mr. Pountney Smith, and there is, therefore, little in the church to interest one architecturally, beyond the tower, some remains of the old glass,—now utilised in the modern mortuary chapel, over the Corbet vault,—and a curious "Pieta" of oak. On the north side of the churchyard is a somewhat uncommon example of a Jacobean lych-gate, which is worthy of attention.

The next halt was made at Shawbury, a church of considerable importance, both from an antiquarian and an architectural point of view. There was apparently a Saxon church here, as it is mentioned in Domesday as having both church and priest, and the font, still existing, has every appearance of Saxon workmanship. Shawbury formerly included in its parish the chapelries of Acton Raynald, Moreton Corbet, Grinshill, and Great Withyford, in each of which chapels and cemeteries were consecrated by Bishop Roger de Clinton, of Chester, who states in his certificates that they belonged to the mother church of Shawbury. The nave arcade has some excellent capitals of late Norman date, which are of very refined and pleasing design, while the north and south doorways, also Norman, are worthy of study, especially the latter. The tower, like many others in this district, was built in the time of Henry VII.

Leaving Shawbury, a short drive took the members to Moreton Corbet, the *bonne bouche* of the day, as not only is the church of considerable interest, but the ruins of the mansion are one of the finest examples of the early Renaissance in England that remain to us. They may be classed in the same category as the far better-known example of Kirby Hall, though this latter excels in refinement of detail, which at Moreton Corbet is in parts somewhat coarse. From the date to be seen in several parts of the ruins, it appears that 1579 was the time when



what exists was erected, but it has never been completed, and in 1644 was reduced to ruins during the great rebellion. The remains of the Renaissance mansion comprise the principal parts of the eastern and southern wings of the intended structure, including part of the great hall. Besides these, there are some considerable remains of an earlier residence or castle, both

of the twelfth and fifteenth centuries, which are both picturesque in appearance and interesting in plan. The Renaissance work joins the fifteenth century work, and this again connects to the earliest portion of all, which was probably built by Peter Fitz-Toret, whose name frequently appears in Shropshire records between the years 1160 and 1194, and who was a direct descendant of Toret the Saxon, who lived in the time of Edward the Confessor. Peter Fitz-Toret's son Bartholomew took the name De Moreton as a local title, and the place was then known as Moreton Toret. The daughter of Bartholomew de Moreton, who died about 1235, married Richard Corbet, of Wattlesborough, the ancestor of the Moreton Corbets, who commenced to build the house, and have ever since possessed it. In the aisle of the church, forming the Corbet Chapel, of the Decorated period, are two interesting tombs, the one of Robert Corbet, who died in 1513, treated in Gothic fashion; the other, similar in many respects, of Richard Corbet, who died in 1566, showing Renaissance detail. The tower, of Henry VII.'s time, has some curious pinnacles, exemplifying the latest phase of Perpendicular work. Leaving Moreton Corbet with reluctance, even though the time allotted to the visit was extended by half an hour, the party proceeded to Haughmond Abbey.

Haughmond Abbey was founded by William Fitz-Alan between 1130 and 1138, on the site of an older hermitage and chapel, as a priory for Austin Canons. About the year 1155 it was raised to the dignity of an abbey, when the founder gave to it St. Andrew's Church at Wroxeter, and other benefactors made grants. No remains of the church exist beyond the foundations, and these were not visible to the members of the excursion. The church was cruciform, with a square east end, and, as was usual with the order of Austin Canons, formed a parish church. It is also an example of the very rare dedication of a large Mediæval church to St. John the Evangelist. The Lateran is dedicated to the two saints bearing the name of John, but probably the cathedral at Lyons is the only great church having a similar dedication to that of Haughmond.

The most perfect part of the abbey now remaining is the chapter-house, of Norman Transitional work, with a rich doorway, and with a flat ceiling, having moulded beams and joists, which is apparently a fourteenth-century insertion. The doorway has also been modified in the fourteenth century by the insertion of figures of saints between the shafts of the Transitional doorway. It is quite possible that these merely replace older figures, as, although clearly of fourteenth-century date, they fit in so well with the mouldings of the arch as to give the impression at first that they form part of the original work. Bearing in mind the exceedingly French character of much of the detail, both in this doorway and in the contemporaneous cloister, there is no difficulty in believing that the doorway originally possessed figures in a similar position to those existing,—a position exactly analogous to the commonly-found design of French doorways. The figures have been mutilated, and it is somewhat difficult to identify their iconography; but they appear to represent a mitred abbot and St. Thomas of Canterbury, St. Augustine and St. Michael, St. Catherine and St. John the Evangelist, St. Margaret and St. John the Baptist.

Of the refectory and the cloisters only a small portion remains, but sufficient to show the Early French character of the work.

The great hall, of thirteenth-century date, is in a fair state of preservation, although roofless, and lacking the tracery of its large end window (see sketch, p. 116, *ante*). The side windows are interesting, showing as they do the arrangement for the shutters below the transom and for glazing above.

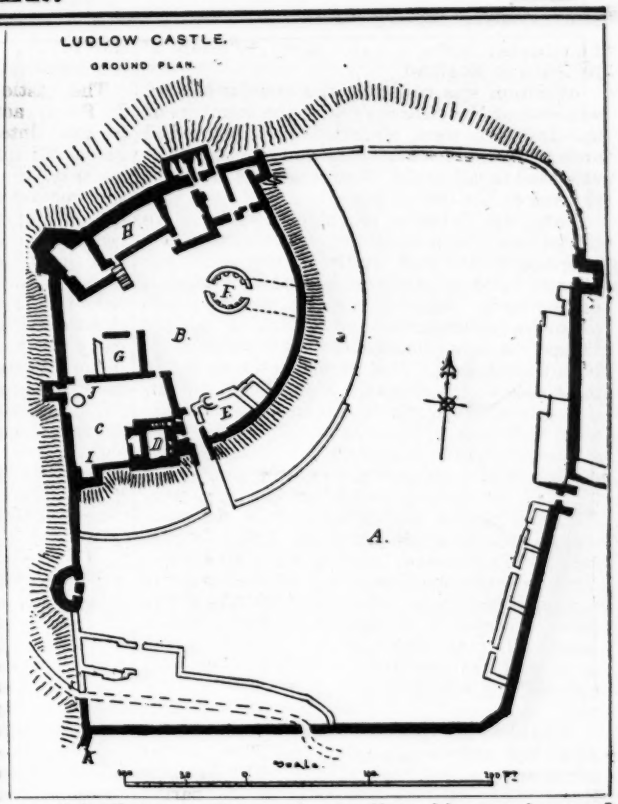
The hospitium, or abbot's house, is also an interesting example of still later fourteenth-century date, so that the ruins provide plenty of material for study and sketching, although many of the party, probably demoralised by Moreton Corbet, seemed oblivious to the beauties of the early work. Hence it was comparatively easy for the honorary amateur photographer to gather the party for a group photograph before some of them seized the opportunity of getting away early. A very picturesque little structure exists in the well-house at Haughmond, a stone walled and roofed building, about 10 ft. by 7 ft., placed in the wood, a little distance from the abbey buildings.

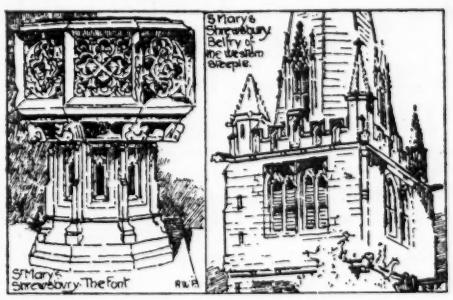
Thursday, August 13.

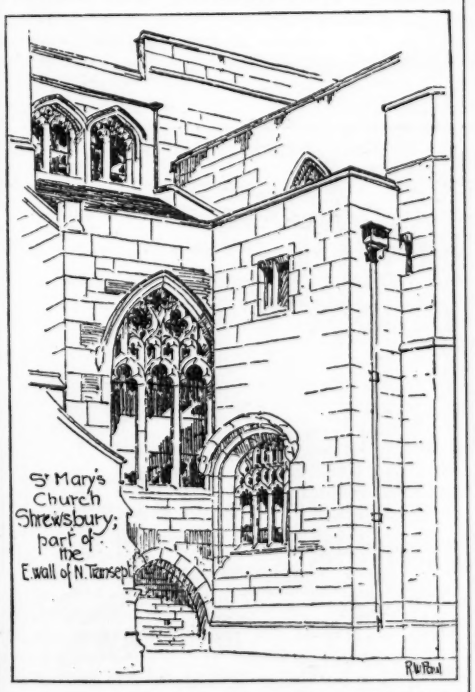
The travelling for this day being by rail, it was arranged to visit first the Church of St. Mary, Shrewsbury, before taking the train away from the town.

St. Mary's, Shrewsbury, is a church of very old foundation, for although King Edgar, about the year 980, established here a college of secular clergy, it is probable that the parish church existed before that time. During the Mediæval period it maintained an important position as the mother church of a large parish, and as a royal free chapel was exempt from the jurisdiction of the bishop till 1846.

Architecturally, it contains a vast store of material for studying work of all dates, from the twelfth to the fifteenth century, and is especially rich in Mediæval stained glass, the greater part of which has been brought from other places. Thus the great east window contains the splendid glass that once adorned the chancel of old St. Chad's Church, and from its containing a reference to the donor, Sir John Charlton, who was a great benefactor to the church of the Franciscan and Grey Friars in the town, it is presumed that it was originally in that church. From the dates of Sir John Charlton's family history, it is probable that the glass was made about the year 1352. It has, of course, been considerably altered and repaired at the time of its various migrations. Another window, depicting the life of St. Bernard, was originally in the Abbey of Altenburg, near Cologne. There is also in other windows of the church a large amount of old stained glass, collected, chiefly from German sources, by the Rev. William Gorsuch Rowland, vicar of the church from 1827 to 1851.



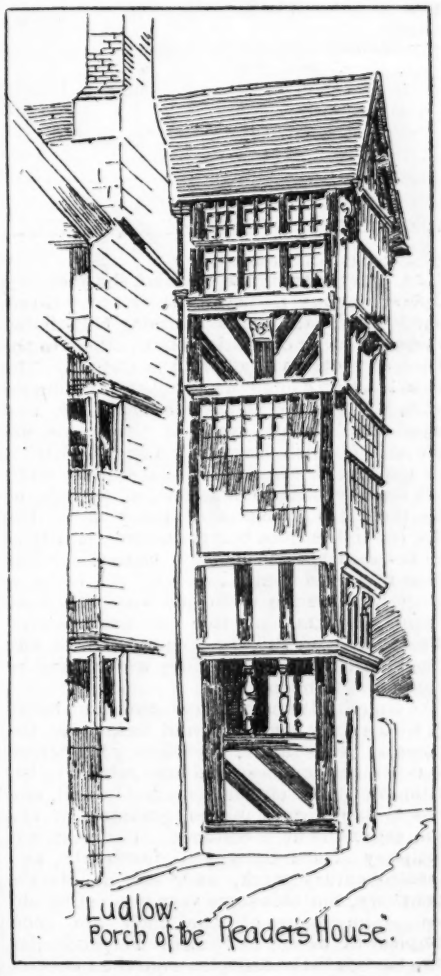


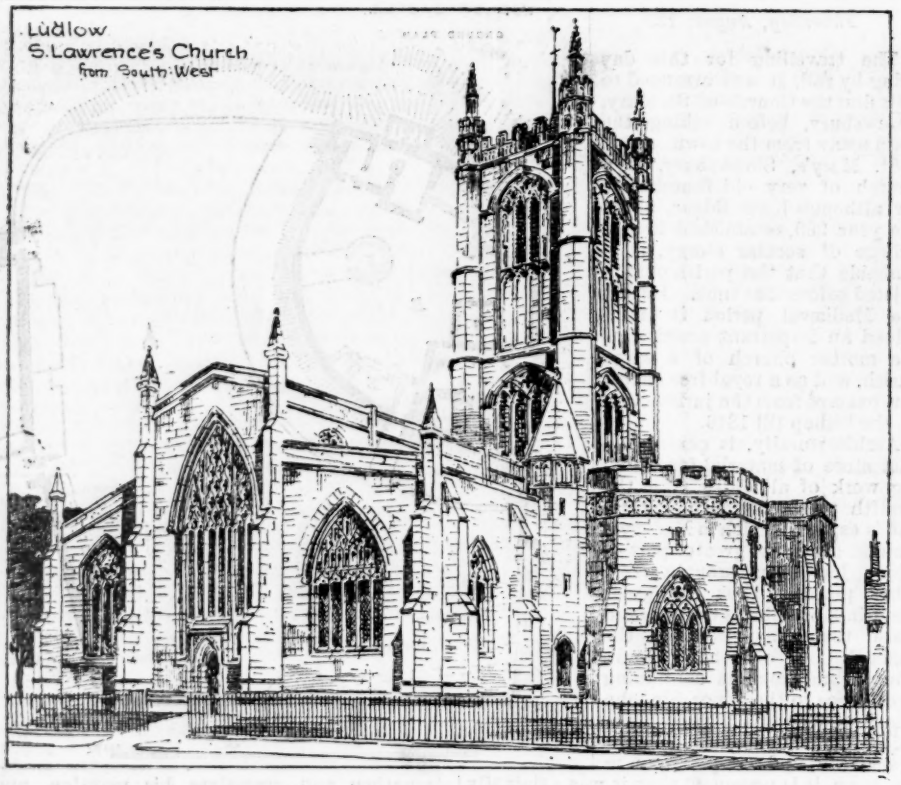


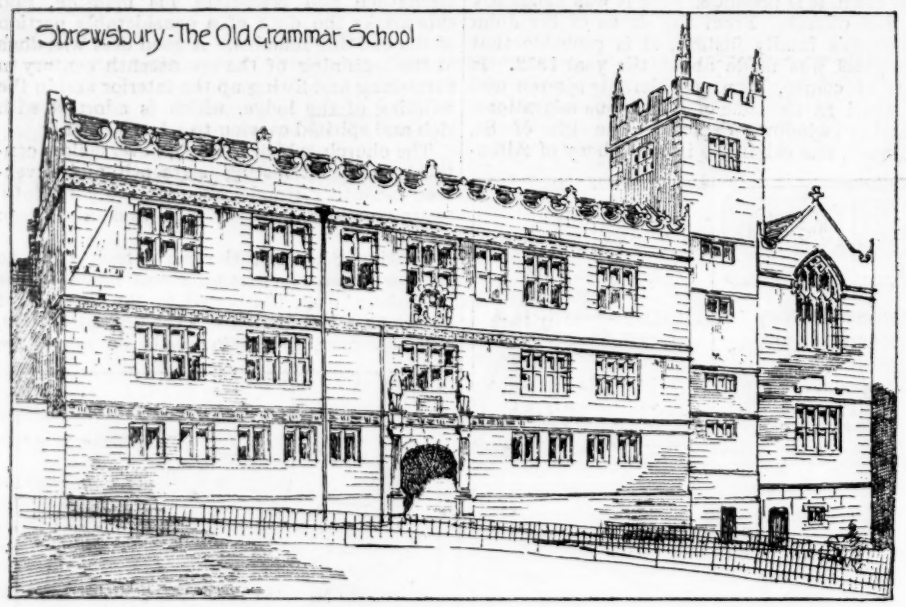
After the visit to St. Mary's Church, the members started for Stokesay Castle (see ink-photo illustrations), whose picturesque features are so well known in the architectural world. In the nineteenth year of Edward I., Lawrence de Ludlow obtained leave to strengthen and crenellate his mansion, and this marks the date of a considerable portion of the existing remains. A good deal was done at the beginning of the seventeenth century in furnishing and fitting up the interior and in the building of the lodge, which is adorned with rich and spirited carving to a large extent.

The church, which is small, nevertheless contains some interesting sixteenth and seventeenth-century woodwork, noticeably an interesting canopied family pew and a western gallery.

Leaving Stokesay, the party took train to Ludlow, where the first visit was made to the "Feathers" Inn, illustrated in the *Builder* of last week. Here lunch was the first attraction, and, that over, admiration could be spared for the beautiful plaster work, panelling, and carving in the first-floor rooms, as well as for the rich street front shown in our illustration.

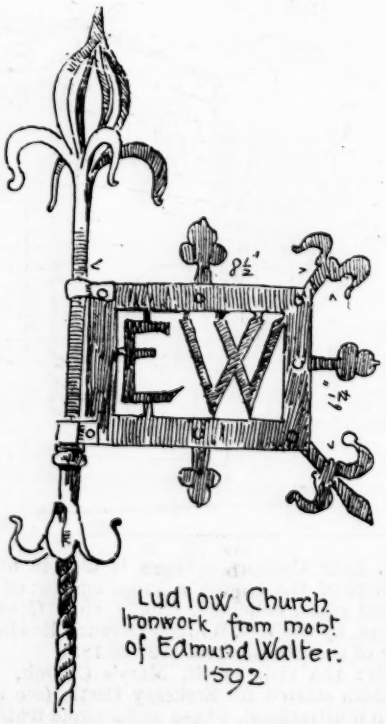






The party then broke up, and the members dispersed about Ludlow as their fancy listed, some to sketch the many charming half-timber houses and other domestic details, others to the Castle, and others again to the Church. The Castle is a very complete example of a Mediæval castle, with outer bailey, inner bailey, and keep. The earliest parts of the castle are Norman, of which date are the keep and what now remains of the chapel. Subsequent additions have been made at almost all periods, so that there are examples of many dates, the majority of the work being, however, mostly of the fourteenth and fifteenth centuries. The castle remained almost intact till the reign of George I., when the roofs and woodwork were stripped, and amongst the spoil some painted panels from the hall have now found their way to the "Bull" Hotel, where they were visited by some of the members.

The church, although a large, cruciform building, with a lofty central tower, has, under the process of "restoration," lost largely in interest. The central tower, lately almost rebuilt by Sir Arthur Blomfield, stands remarkably well, and forms a fine feature in the grouping of the town, especially at a distance. The church is principally of the thirteenth, fourteenth, and fifteenth-century work, and, like St. Mary's, Shrewsbury, contains some very interesting old glass. The stalls of the choir are good examples in design of Late Perpendicular work, though their canopies were then uncompleted; this is now being done by degrees, apparently, as funds permit. One of the finest evenings experienced during the week made the excursionists wish that the return journey were being undertaken by road instead of by rail.



Friday, August 14.

The last outing day of the excursion brought with it saddened hearts at the prospective termination of the week's enjoyment, but these were speedily cheered by the unequalled beauty and fineness of the weather, which, as if to dissipate the despondency, was more bright and sunshiny than on any previous day. Thus the long drive to Pitchford Hall, the first halting-place, sufficed to bring all the members to an appreciative state of mind, which permitted their speedy captivation by the beauties of the house. Pitchford Hall, as may be seen from the illustration in the *Builder* of last week, is one of the largest and finest half-timber houses to be found in Shropshire, and is a splendid example of a sixteenth-century country house, having been built by William Otley, Sheriff of Salop, in 1500 and 1514. Within, it contains a wealth of panelling and carving, chimney-pieces, and furniture, which render it a perfect dream of delight to any lover of architecture, to say nothing of the many excellent pictures by Romney, Teniers, and other artists not so widely known. One of the most interesting features of the interior is the heptagonal bay, of which the exterior is seen in the centre of the front towards the river shown in our illustration. The effect internally is remarkably good and pleasant, which is, perhaps, more than can be strictly said of the exterior of this particular feature. There is a small church with a curious effigy of Sir John de Pitchford near the hall, but the house possessed so many attractions that the members took care to spend the whole of the two hours allowed, and a little more, on the domestic work. The general plan of the house is F-shaped, the chief entrance being in the centre of the quad formed by the projecting arms, the upper one of which, so to speak, is shown in our illustration with the heptagonal bay on its outer side.

Leaving Pitchford, after considerable efforts on the part of the quartermaster and his whistle, a short drive brought the party to Acton Burnell, where a shower seconded the lack of architectural detail at the Castle to drive the members into the church. The castle was founded by Robert Burnell, Bishop of Bath and Wells, and is a square building, with a tower at each angle; it was used as a meeting place for the Parliament of Shrewsbury, which adjourned hither in 1283. The church proved to be the best piece of ecclesiastical architecture, not in ruins, met with in the outings from Shrewsbury, but the interest of the members was chiefly concentrated on the tomb of Richard Lee, who died in 1591,—a sad falling-off from the times when the late Mr. Edmund Sharpe led the Architectural Association excursion. In his time, and under his guidance, the exquisite thirteenth century windows of the chancel, with their Early Geometrical tracery, their marble shafts, and their richly moulded rere arches, would have been the centres of attraction, and would have been carefully measured and plotted on the spot. The excellent, yet simple, font, and the transepts with the arches to the crossing, all thoroughly good and well designed, would have been studied. Verily in architecture, as in all things else, "*Tempora mutantur et nos mutamur in illis.*" Scarce could a few of the busy bees who swarmed in a compact body around the strapwork in alabaster spare a moment to look on the remarkably fine brass of Nicholas, Lord Burnell, who died in 1382, still less to study the beautiful tomb on which the brass rests.

The founder's tomb in the south transept, the piscina adjoining, with its credence shelf, and,—like that in the chancel,—with two draining-sinks, were not even glanced at by the majority of the members, but are nevertheless well worthy of study. There is, too, a collection of old tiles from different parts of the church now forming the floor of the north transept, which contain some interesting examples of Mediæval design in small things.

After luncheon, three-quarters of an hour's driving brought the party to the last visit of the day, at Condover, where the hall, illustrated in the *Builder* of last week, was first looked at, the exterior fully and the interior partially only, as the owner (Captain Reginald Cholmondeley) and his family were at home. The house was erected by Sir Thomas Owen, Lord Chief Justice of the Court of Common Pleas, and retains most of its original form, though some of the features have been restored. Among the interior attractions were the pictures, of which Turner's "Battle of the Nile" is, perhaps, the

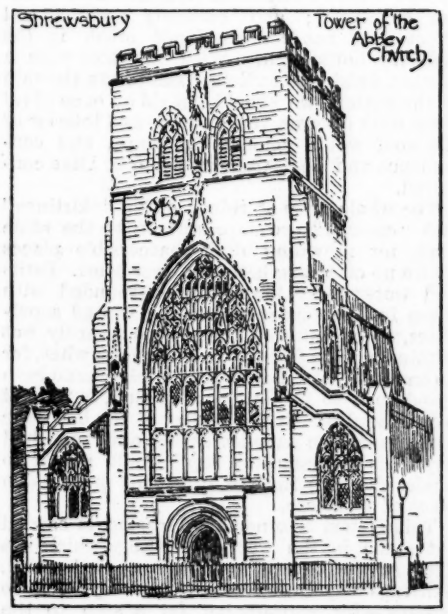
EAST SIDE.

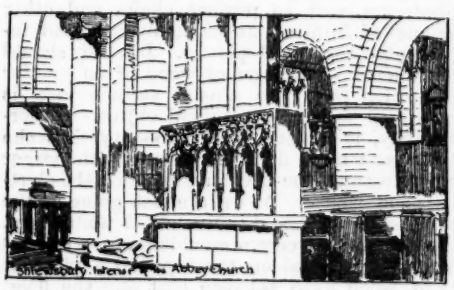
WEST SIDE.

Ancient Cross, St. Bartholomew, Corton.

chief, though there are many others both beautiful and valuable.

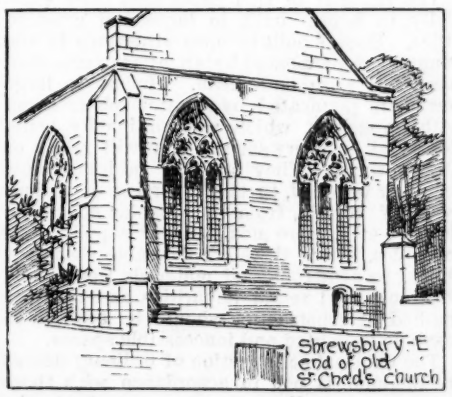
The church at Condover possesses considerable interest, chiefly from its plan, with a very





wide nave of late date, without aisles, joined to narrow transepts, the northern being of Norman work, and a chancel and chantry chapel opening into the transepts. The south transept externally possesses an exceptionally good half-timbered gable and barge-board above the stonework of the lower portion. There are some tombs worthy of notice to the Owens and the Cholmondeleys.

This brought to a close the active work of the week; and in the evening the usual break-up dinner, with toasts and songs, exhibition of sketches, and election of the executive committee, together with a discussion as to the next trysting-place, prepared the members for their departure from Shrewsbury.



Some few, however, kept to the programme, and, under the guidance of Mr. Lloyd Oswell, of Shrewsbury, visited the old schools of Edward VI.'s foundation, the Castle, the Abbey Church, and other interesting features of the town. Another considerable party started off for a seven mile drive to Adcote, in order to view Mr. Norman Shaw's work there; while others, again, departed for Birmingham to inspect the new Assize Courts on their way home.

In such various ways was brought to a conclusion a most successful week, especially remarkable for the skilful preparation of the programme. No day was a blank day, but each possessed at least one especially good piece of work, and none of the places visited were absolutely disappointing, while ample time, in reason, that is, was allowed for all the work visited.

ANCIENT CROSS, ST. BARTHOLOMEW, CORTON.

At the Church of St. Bartholomew, Corton, near Lowestoft, which has been for some time under restoration by Messrs. Bottle & Olley, architects, Great Yarmouth, some interesting discoveries have been made.

After the scaffolding for the restoration of the chancel had been put up, it was found that the east-end cross was of special interest. The cross was found to be of late fourteenth-century work, and not only are the arms of the cross of elaborate and delicate design, but on the east side is a carving of the Virgin and Child, in a good state of preservation, while on the next side is a carving of the crucified Saviour. The east side, although exposed to the salt air, is in a better state than the west side.

Carved crosses of this kind are rare, but there are examples (some with carving on one side only) at Oakham Church, Rutlandshire; at Bolton Percy, Yorkshire; and at East Rudham and Watton Churches, in Norfolk.

A portion of the sedilia, and also some elaborate stonework belonging to the church, have been discovered in the foundations and interior of the walls of an old house in Corton, belonging to Mr. J. J. Colman, M.P., where alterations are now being made. It seems evident that these stones came from some church, but until a few days ago there was nothing to connect them specially with Corton Church. Then, however, a piece of stone was found which, on comparison with the remains of the sedilia, was found to be the springing-piece of one of the arches, the delicate carved crockets being as perfect as the work in the church. Other stonework was also found, and the above gives some sort of presumption that these also came from Corton Church. They include a quantity of flat tracery and ornamental work, and two beautiful small figures of St. Andrew and St. Catherine of Alexandria, the former being perfect. The figure and the insignia of St. Catherine bear considerable resemblance to those in a stained-glass window in Henry VII.'s Chapel. She has a sword in her right hand; the point of the sword rests upon a grim crowned head which is intended to represent the tyrant Maximinus. He is grasping her wheel in his hand. These figures,

and the other ornamental work, when laid out, are just the depth which the top part of the inner cill of the east window is below the proper window cill, and some of the stonework seems intended to form perpendicular panels on each side of the altar; but the stones are too fragmentary to enable one to be certain of this. Mr. Colman has kindly given to the church all the stones which have been found.

SEVENTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

Resuming our special report of the proceedings of this very successful Congress, which came to a formal end on Monday last, we revert at once to

SECTION VI.—ARCHITECTURE IN RELATION TO HYGIENE.

On the second day of the meeting of this Section, Sir Arthur Blomfield, on taking the chair, announced the temporary absence of M. Trélat, whose paper had the first position on the day's programme, and invited any foreign member to read the second paper, which was in French, forwarded by its author, Mr. P. J. H. Cuypers, architect, Amsterdam. No foreign member volunteering, the paper was read by Dr. Sykes, one of the honorary secretaries of the Section.

Pile Foundations on Marshy Land and the Exclusion of Damp from Dwellings.

In the Low Countries, said Mr. Cuypers, dwelling-houses have for many centuries been built on marshy sites, even in large towns like Amsterdam and Rotterdam. The necessary base on which to place the foundations of such dwellings is obtained by driving in piles, a resistant surface being in that manner obtained much larger than the actual area of the ground-floor of the house to be built. The consolidated area once obtained, upon the heads of the piles the builder proceeds to simply lay his foundations of masonry and then his superstructure. In former generations, when mechanical appliances were far less perfect than at present, many houses were built in this manner. But the piles were numerous and small, and were held together by strong tie-pieces under portions of the wall. Modern constructions of the kind are much larger and are built on more scientific principles. The size of the cross-section of the timbers has been much increased, and their number has consequently been diminished. In the most scientific of the modern constructions of this kind timbers of the largest section procurable are used, and in beams as long as possible. These large piles can frequently be driven through the sand into the clay. In such conditions a pile will frequently attain a force of resistance of 18,000 kilos (eighteen tons). At times the bed of sand is so thick that piles between 60 and 70 ft. long are unable to reach the clay. To be lasting the timbers require to remain always under water. If any portion is occasionally exposed, rot soon sets in, but instances have been known, where the immersion is total, of ancient piles being found after the lapse of 300 years almost intact. When the crust of foreign matters has been scraped off such ancient timbers, the outside of the wood has been found as black as ebony and as hard as metal. In other cases where the ends have been partially exposed and parts of the timber had been dried, the ends were found to be rotten, and from this cause many a fine old monument in Holland has been ruined and lost. A remedy can sometimes be applied by cutting off the heads of the piles, and introducing masonry instead. In former times builders used to put the brick foundations of their walls immediately on the heads of the piles, but according to the common practice of the present day a combination of joists and boards is employed; but such a construction is only allowable on ground less swampy than is generally to be found in most of the chief towns of Holland. Some civil engineers cover the heads of the piles with masses of concrete, but this is likewise impracticable on very swampy ground. Cellars can be constructed which are perfectly healthy. Although the soil may be completely saturated, the humidity is not felt at all. The whole dwelling is preserved from the slush which exhales disagreeable vapours night and day. If a house built in a former century has no proper cellars, and the foundations will not permit of their being constructed, complete cellars can be made within a wooden case, like a great vat, which can be placed at any required height. During the time of construction the water can be kept at a lower level. Even when no foundation at all exists cellars of this kind can be formed, carrying a masonry foundation. They cannot sink in the marshy soil because the volume of water displaced is greater than the weight of the cellar, which is hollow. Cellars of this kind rise and fall with the level of the water between the walls of the house by which they are kept in place. Many houses in the town of Holland are built close to the water's edge, and these are not less healthy than the rest of the houses in the town if the foundations are executed with care. Indeed all the houses of these towns have their foundations equally under the surface of the water without disagreeable or unhealthy consequences to the inhabitants. Pine and oak,—above all, long pine trees,—offer very great resources for building purposes in very bad soil. Wood, which has naturally so little resistance, cannot be replaced by any other material whatever.

The paper gave a technical description of other methods of executing foundations in circumstances scarcely ever met with out of the Low Countries, such as dwellings in connection with canals and ditches. On the legal side of the question Mr. Cuypers makes the following remarks:—During the last 200 years the custom of occupying cellars for workshops and all sorts of commercial purposes has greatly extended in the great towns, on account of the great expense of sites and foundations. Many of these cellars can only be kept clear of infiltrations by pumping daily. Twenty years ago residence in such holes was forbidden by law, and within a given time, the use of them will not be longer tolerated.

Sir Arthur Blomfield, after inviting discussion, said they were all greatly indebted to the author for this most interesting paper, and to Dr. Sykes for the excellent way in which he had read it. There was no discussion on the paper, but Dr. Sykes called attention to the interest of the remarkable modes of constructing the floating cellars described in it.

Some Insanitary Superstitions in House-Building.

Mr. H. H. Statham, F.R.I.B.A., next read a paper bearing the above title, and which was as follows:—

The remarks in this paper refer more especially to houses built in large and crowded cities. Houses built in open situations in the country are permeated by an atmosphere comparatively pure and clean. Houses in large towns are permeated by an atmosphere laden with impurities, which are continually being deposited on every surface that will retain or absorb them. They are also subject, unless carefully watched, to the incursion of various types of vermin, from the popular cockroach down to even more noxious and happily rarer examples. It is therefore desirable that they should be constructed of materials least likely to absorb and retain impurities, and that the method of construction should be such as to leave no unlighted and inaccessible spaces.

The habitual construction of ordinary houses in England is not in accordance with these requirements. For many generations the orthodox manner of making a house floor has been to lay wooden joists from wall to wall with boards nailed down above, and a lath-and-plaster ceiling beneath, the space between being an unseen cavern for the accumulation of whatever dirt and decaying matter can find its way in. What the results may be I once saw in the worst form in a case where the boards of an East End schoolroom were taken up to ascertain the condition of the joists. The space between those joists was filled nearly to the top with a festering mass of dirt and dust, over which the children had been daily collected. Such a floor would not be allowed in a modern London Board School, but it is the accepted floor for a dwelling-house; and though the conditions of a well-kept dwelling-house do not encourage such an accumulation as this, I believe the tenants of the best kept London house which has been inhabited for any length of time would be disagreeably surprised at the amount of dirt they would find under their flooring boards if they looked for it. The old-fashioned system of ceiling up to the under side of the flooring boards and leaving the joists visible is far more sanitary; the drawback is that it is unsightly, and that it does not shut out sound sufficiently. Double flooring boards with felt between would get over the latter objection to some extent; but what I wish to recommend is the general adoption of solid floors of iron and concrete with a wood block or plain parquet floor on them, for the average town dwelling-house. They are almost necessarily adopted for houses in flats, why not for every dwelling-house?

In the same way it has for many generations been the recognised faith that a house roof can only be made by means of rafters laid on the slope with a tie at the foot, and with ceiling joists either at the springing of the roof or part way up the slope. The advantage of this is that the upper rooms which go partly into the roof are rendered inconvenient and unsightly by a low sloping ceiling to half the room, and that above the ceiling joists is a dark cavern between them and the roof, into which no one ever sees, and where dirt may accumulate and vermin may breed undisturbed. It is really an almost alarming thought to reflect what is the probable cubic content of these dark caverns in the roofs of houses over all London. If it be thought necessary to go on building sloping roofs, either the whole slope of the roof should be thrown into the top rooms, as the visible ceiling, or the ceiling of the highest living rooms should be at the level of the roof springing, and the space between that and the rafters should be treated as storage space easily accessible and sufficiently lighted to be readily examined from time to time. But, in fact, it is entirely unnecessary, in these days of iron, and concrete, and tile, that we should build sloping roofs at all; the doing so is a mere superstition, except where reasons of architectural effect are concerned; and certainly architectural effect does not concern itself much in the ordinary house roof. With flat roofs with a cement finish and sufficient fall to run the rain to the gutters, we should get rid at once of all these dark caverns, the exterior and interior of the roof would coincide in shape, and convenience and healthfulness would be alike consulted.

The whole tribe of things called "skirtings" and "casings" are superstitions of the same kind, for providing dark inaccessible places where no cleansing hand can ever come. Baths and watercloset basins are surrounded with those foolish fences of joinery; whited sepulchres, which indeed appear neat outwardly, but within they are full of—no one knows what, for no one ever looks. Let both watercloset and bath stand open to inspection all round, instead of being cased in. In the matter of the bath, the money spent on panelled casing and "polished baywood or mahogany top" would go far to render the bath itself a neat and presentable piece of furniture.

This system of ornamental casing is carried out again in the wooden skirtings which are fixed at the base of the walls of each room. Skirtings may be considered necessary for three reasons,—for appearance, for a stop to the plastering, and to prevent chairs and other articles of furniture knocking against and injuring the paper and plaster. But they should be in a solid thickness of wood of no greater projection from the plaster surface than is necessary for their practical object. Unfortunately, it is considered necessary that the larger and more dignified a room is the larger moulding and the greater projection the skirting should have. As we are not going to the expense of putting down moulded timber 3 in. thick round the room, a moulding of the desired projection is fixed on the top, and a piece of $1\frac{1}{4}$ in. wood fixed between that and the floor, with a nice hollow space behind. The result is often rendered audible by the scuttering and scrambling of the mice, who are enjoying their

gambols in the private corridors which we have obligingly provided for them.

Casings for pipes are, no doubt, necessary, and are generally specified to be screwed on, so as to be removable when required. They never are removed, or the space behind seen, except when something is wrong with a pipe. They should be hinged, and made with button fasteners, so that they can be opened every day without any trouble. Among other drawbacks, they form a private lift or elevator for the cockroach, who is fond of warmth, and is enticed to ascend along the line of the hot-water pipes. The cockroach is bad enough in the kitchen, but a good deal worse in the bedroom; it is hardly worth while to afford him the luxury of a private passage, heated with hot water, to the upper floors.

The passion for sash-windows in this country leads to the employment of another system of wooden cradling built up round the windows, with hollow inaccessible boxes for the lines and weights, besides (generally speaking) another set of hollow spaces behind the back of the shutter-casings. It is perfectly possible to make sash-windows without pulleys and weights in more ways than one, unless when they are very large and heavy. But the casement-window has the advantage that it can be hung in solid frames without any of this bandbox work round it, and making it weather-tight is merely a matter of care and scientific construction. It is worth consideration whether we should not do better to return to it as the more wholesome and sensible structure of the two.

Another curious superstition is that windows must have curtains. The recognised principle seems to be to make windows much larger than is necessary to light the room, and then to stop out a great deal of the light by hanging curtains over them. This seems hardly either sensible or sanitary. Curtains are terrible collectors of dust and dirt. Everyone knows that a curtain that has been up three weeks in London is hardly fit to touch; and is there any reason, in the nature of things, why windows must have these draperies? Suppose we tried smaller windows, and a more decorative treatment of the frames and glazing, and left them unencumbered by curtains. We should get as much light in a more healthy and sensible, perhaps even in a more decorative manner. Think of the treatment of windows in Oriental houses at Cairo and elsewhere. That could not be copied for this duller climate, nor are copies desirable; but it may afford a hint for a modification of decorative treatment of somewhat similar type.

Wall-paper is a simple and inexpensive means of producing decorative effect in a room, but papers should be close in texture and smooth in surface. Papers with embossed surfaces, and, above all, what are called "flock" papers, are dust holders, and such wall surfaces cannot be kept properly clean. Coloured plaster, finished with a hard surface, is more sanitary than any paper, considering that the paper has a layer of paste behind it which becomes rotten in time. If, however, papers are renewed often enough, and the plaster stripped and well scoured at each renewal, the insanitary element in them is not of sufficient importance to counterbalance the decorative gain.

Large and deep plaster mouldings and decorations are now, fortunately, going out of fashion on æsthetic grounds; they are injurious to the cleanly condition of a house, affording so many pockets for the lodgment of dirt. As long as they are kept flat and in low relief there is no harm in them. The wooden mouldings with a hollow on the top, which are now much used to take picture-hooks, are objectionable, as the hollow is always full of dust. The old brass picture-rods are much to be preferred in this respect.

Furniture, which is a kind of minor architecture, has its superstitions of construction, the worst of which is the system of finishing large wardrobes, book-cases, &c., with a cornice standing up all round the top, leaving a wide pit for dust, which is never seen, and cannot be swept. This cornice is a mere fashion, utterly useless and absurd. The top should be made level or (still better) sloping, and with no raised ledge above it, so that it can be swept. It is best of all to make large erections of this kind as fixtures carried up to the ceiling, and finished with a moulding against the ceiling; then there is no place where dust can accumulate.

The last superstition I will mention concerns that important receptacle,—the cistern. It might be supposed that the reservoir where we store our water for drinking, washing, and cooking would be an object of some interest to the householder; that he would desire always to see and know that it is pure and clean. But it is a superstition that the cistern must not be seen; it is kept in the dark, and generally in a place which is very difficult to get at. When it is supposed that it must want cleaning, it is a business of engaging a man specially who, perhaps, has to bring a ladder to get to it. I knew a case where the water in the house began to have an evil taste, and it was found that a dead bird had been in the cistern for many days in an advanced state of putrefaction. The cistern should be in a well-lighted place, where it can be easily seen every day. The best way would be to make it as an aquarium tank is made, with a front of plate-glass, so that you can see the light through the water.

To keep a town house thoroughly clean is a continual fight, not only against accumulation of dirt, but against vermin. I remember one case where a nobleman who had become tenant of a house in one of the best terraces in London, at a very large rental, brought an action for compensation against the landlord because the house was found to be full of unmentionable insects from top to bottom. This was an exceptional case, and argued great neglect on the part of someone; but it is a fact that the chances are far greater for this sort of pest in houses built with hollow floors, and a great deal of woodwork, than they would be with solid floors and skirtings without recesses behind them. Generally speaking, the clean and healthful condition of town houses is greatly assisted by the use of non-porous materials, as far as possible, and the avoidance of all dark and inaccessible corners. The present system of building town houses is exceedingly faulty in these respects, is capable of radical improvement, and should be improved accordingly.

In the discussion which followed,

Mr. H. H. Collins said he was of opinion that the paper they had just heard read was full of practical suggestions. It was just such a paper as should be presented in that Section. There were many practical points in it which architects, not for the first time, had had lucidly put before them. With regard to solid floors, there were other materials besides iron and concrete that might be used. Among those that might be mentioned were terra-cotta and coke-breeze. One point alluded to was worthy of special consideration. In Captain Shaw's book it had been shown that wood was not the inflammable material it was generally supposed to be. Instead of being the most inflammable of materials, it was in reality one of the safest. It had been found that beams 12 in. square, after the fiercest fire, stood the ordeal so well, that if peeled they could be used again. A floor had been patented which was composed of solid wood blocks. Such floors were not very expensive, and could be produced for six shillings per yard. With regard to roofs, there were climatic reasons for preferring sloping to flat roofs. In winter flat roofs would retain a great weight of snow. The casement windows recommended by Mr. Statham would be very inconvenient, particularly in small rooms with much furniture in them. He agreed with the paper with regard to skirtings, and he objected to picture-rods. There was a system known of picture-mouldings, which he preferred.

M. Charles Lucas (Paris), speaking in French, said the dangers pointed out in Mr. Statham's admirable paper were not the exclusive privilege of England, but were only too well known in France. The dangers of dampness could be met in the larger towns, where damp-proof courses of brick and concrete were often employed. But they had far too many corridors deprived of air; too many alcoves filled up with beds, where no current of air was possible; too many staircases with only the lower portion ventilated. If he had a fault to find with the paper, it was that he considered it chargeable with too great moderation in its condemnation of all the superfluity of hangings and curtains that encumbered the windows of our reception-rooms, and prevented the penetration either of light or air. He demanded, with Mr. Statham, more light, more health. The wall-papers furnished a hiding-place for microbes, and as for insects, a lease in Paris had been recently annulled by a magisterial decision, because the existence of one single insect had been proved. French houses were too often deficient of any means of flushing their closets, and great improvement was required in such sanitary fittings as were required in lavatories, baths, and closets.

Colonel Prendergast said he should have liked to hear further discussion with regard to solid floors, but met as that section was to deal with sanitary matters they would perhaps do better to try to find out how far block floorings would tell against the efficient ventilation of rooms. If there was a ventilating flue, that flue must produce a current of air, and the instant one did that in went the bundle of rags to stop the ventilation. On the question of roofs, Mr. Statham had done good service. In Italy and in the buildings of Ancient Greece flat roofs were universal. But in this country we were told we had no climate, and, therefore, flat roofs were impracticable. If Mr. Statham could solve that problem he would do a very great service to the community. In concluding, Colonel Prendergast again referred to solid floors and to the materials of which they might be made. He said he could see no reason why they should not have solid floors made of paper.

Mr. Ralph Nevill, F.R.I.B.A., said they had in Mr. Statham's paper a condemnation of boarded floors, and if the author could get all architects to follow his example he would do them a good service. It was, however, a question of cost. Six shillings a yard did not seem much for a solid floor, but in the great majority of buildings the expense would be the great obstacle to their adoption. An architect could not force the owner of a house to construct on hygienic principles. Only the doctor could force him to listen to that argument. Architects could not conceive how much vermin were hidden in old houses, not only in London but in country places. He had once to inspect a house a hundred years old, and no one could conceive the thousands of fleas, lice, and other vermin which it had harboured in it. In the ordinary boarded floor, the sole object of cleaning up seemed only to be to wash dirt into the cracks of the floor with dirty soap and water. Solid block floors would be difficult to level if laid on breeze, and such floors would, he conceived, require a layer of asphalte to prevent rot. He recommended the French system of bees-waxed floors. It was a great pity we had none in England. Ladies objected to dance on solid floors, and there was the sound difficulty. The experiments made many years ago in this line of investigation by Mr. Thaddeus Hyatt were worthy of attention. The speaker differed from Mr. Statham as to flat roofs, which would be a constant source of trouble. Unless a man were very rich he could not always be having the plumber about, and such an enormous amount of guttering was required with such roofs that they would be continually in want of repairs. Drapery was indispensable, but the speaker agreed with Mr. Statham in condemning picture rails, but they were often now made without a recess behind, which obviated the objection brought against them in the paper.

Mr. J. P. Seddon, F.R.I.B.A., agreed on most points with the paper. Solid floors need be no disadvantage to ventilation. Pipes to convey air should be laid on, passing from the floor through to the fireplace, just as water-pipes were laid on. He was in accord with Mr. Statham in his jeremiad against hollows. Hollow walls were a prejudice. They were intolerable for harbouring vermin. A very perfect and cheap wall could be made with two 4½ in. brick walls, with an inch air space. The inside joints might be left a little open, and the cavity filled in with Portland cement grouting, and the courses might be bonded by a few tie-courses being placed under or over the window. The walls thus become very solid. Hollow walls, like everything that was hollow, were injurious.

Dr. Hayward thought he heard a remark advocating ventilation by the fire-place. Proper ventilation could not be obtained by means of the fire in a room, unless the fire was continually alight. Ventilation, to be effective, must be continuous, automatic, and costless. The kitchen fire might be kept continuously going, and if all outlets were made to go to the kitchen fire they would get the required continuous and automatic current. The kitchen fire would suck air from the whole house.

Col. Seddon, R.E., referring to the passage in favour of solid floors, described arrangements adopted by him for forming of concrete the floor of a gun battery at Portsmouth. After a time it developed cracks. These he filled up with old railway iron which, when laid in the

[*Continued on page* 149.

Illustrations.

COMPETITION DESIGN FOR THE COMPLETION OF SOUTH KENSINGTON MUSEUM.

THE design which we publish this week for the completion of the South Kensington Museum was submitted by Mr. William Young, of London. We quote the following descriptive particulars of it from the Report which was sent in with the design:—

"The buildings generally consist of top-lighted courts, with galleries surrounding them, extending along the Cromwell-road and Exhibition-road fronts, the galleries being side-lighted on the ground and first floors, and top-lighted on the second floor. A basement, 12 ft. high, is provided under the whole building.

The eastern portion contains the additional office accommodation required for the Administrative Department; the European Courts and Galleries and additional library accommodation are placed in the centre; and the Oriental Courts and Galleries in the western portion of the new buildings.

The main entrance is placed in the centre of the south front, sufficiently recessed to allow an easy carriage drive thereto within the boundary railing. Lodges are placed within the boundary, at the entrance and exit gates.

There is also a public entrance at the north end of the Exhibition-road front, and a connexion with the subway is brought to this entrance, so that the public would pass through the same turnstiles in entering the Museum, whether they approach from Exhibition-road or the subway,—an arrangement which will save one set of attendants at the entrance.

Service entrances are provided at the east end of south front, and at the north end of the west front, with an uninterrupted roadway round the back of all the buildings from the present carriage entrance at the eastern end of the south front, which is retained, to the new carriage entrance in Exhibition-road, and connecting also with the present carriage entrance at the Science Schools. A lift is provided near each service entrance.

The scheme of the plan has been to take up and continue all the present lines of circulation and to avoid any *cul-de-sac*.

1. *Central line*:—From the main entrance there is a direct communication in the central axis of the building north and south through a grand central court to the Art Fabrics Gallery, and it is suggested to continue the line of circulation by a glazed arcade to the corridor which crosses the building east and west by the refreshment-rooms.

2. At the eastern side of the building the line of communication from the Italian Court through the centre of the Lord President's Court and Architectural Courts is continued to the New Galleries fronting Cromwell-road, and connects with them at the north end.

3. From the last-mentioned point there is a direct line of circulation on the ground, first, and second floors through the various side-lighted galleries extending along Cromwell and Exhibition roads to the entrance at the north end of the new buildings. These galleries also communicate with the various top-lighted courts.

From the court to the north end of the new building a communication is shown with the Art Fabrics Gallery by a slight alteration of the present building on the ground floor.

4. Behind this line of circulation there is a direct line of circulation through the whole of the top-lighted courts extending from the east to the west end of the building, and connecting with the various lines of circulation running north and south.

To facilitate communication, staircases are placed (1) at the east end of the new building, (2) at the south-west corner, (3) at the north-west corner communicating with the entrances there, and (4) a grand staircase in the central court, giving direct entrance to the Art Library.

The accommodation provided is as follows, viz.:—

1. *Eastern Portion*:—The offices, communicating with the present offices

On the ground floor,	3,000	superficial feet	
,, first ,,	4,500	,,	,,
,, second ,,	4,700	,,	,,
,, third ,,	4,500	,,	,,
,, fourth ,,	4,700	,,	,,
Total	21,400	,,	,,
Required	20,000	,,	,,
Spare accommodation	1,400		,,

An unpacking-room, containing 5,500 superficial feet, and an open court for delivery by carts; also refreshment-rooms, kitchen, &c., for the staff, and other accommodation in the basement.

2. *Central Portion*:— European Courts and Galleries containing

On the ground floor,	35,000	superficial feet	
,, first ,,	16,000	,,	,,
,, second ,,	10,000	,,	,,
Total	61,000	,,	,,
Required	45,000	,,	,,
Spare accommodation	16,000	,,	,,

Top-lighted gallery for exhibition of students works, 6,000 superficial feet, additional library accommodation for 60,000 volumes, and two working-rooms.

3. *Western Portion*:—Oriental Courts and Galleries containing

On the ground floor,	40,000	superficial feet	
,, first ,,	22,500	,,	,,
,, second ,,	16,500	,,	,,
Total	79,000	,,	,,
Required	65,000	,,	,,
Spare accommodation	14,000	,,	,,

Over 45,000 superficial feet of above is in top-lighted courts and galleries.

It has been an object in preparing this design to keep in view the purpose for which the building is intended. Perfect lighting is obtained throughout. There is no difficulty in getting sufficient and proper lighting in the top-lighted courts and galleries, and in the side-lighted galleries the windows are made as wide as possible consistent with solidity; in a large portion the window openings are wider than the wall-space between them.

The front portion of the basement is also well lighted, and the internal portion will be lighted sufficiently for storage purposes by the wells for light and air introduced between the various courts.

A feature has been made of the central court and staircase to form a grand entrance, keeping in view that it will also form an exhibition court. Otherwise, the internal architecture is of the simplest description, so as to give the whole of the wall space, and also the floor space, for exhibition purposes.

The style of architecture adopted is that of the present buildings,—viz., the fifteenth century, or best period of Italian Renaissance. The arcading and window treatment of the present Exhibition-road front and the open quadrangle being taken up and brought in at various parts of the design, leading up to a larger and loftier treatment in the centre block.

The quadrant form of the plan connecting the centre block with the wings may be regarded as part of the elevation effect. The requirements of a carriage-drive inside the boundary railings to the main entrance lends itself to this form, which is beautiful and picturesque in effect, and although often adopted in the great buildings of the past, it has not yet been done in a great building in London.

The towers are all made use of for ventilation shafts and to contain water storage for fire-extinguishing purposes.

An open court is formed between the present Science and Art Schools and the new building, thus preserving the side-lighting of the present buildings and the dwelling-houses.

Under this court the boilers for heating, as well as the plant for electric lighting, are placed, so that they are entirely outside the walls of the museum building. The centre portion is raised above the ground, so as to give a height of 20 ft. to this part of the basement to facilitate lighting and ventilating.

Coals and plant can be put direct into the boiler-house from a separate entrance in Exhibition-road.

The walls throughout would be of brick, with brick, stone, and terra-cotta facings to the streets and open courts. The floors would be iron joists and girders enveloped in concrete. The roof also to be of iron and steel. No wood or other inflammable material would be employed in any part of the constructional work.

Fireproof doors to be put between the galleries and courts.

The warming to be by hot water on the low pressure principle, the boilers as before stated being placed under the open court adjoining the present Science and Art Schools, the main pipes being carried under the basement ceiling. The whole of the ground floor being heated by radiating pipes in channels formed in the floor and covered with gratings. The upper floors to have the pipes carried round the walls of the various galleries with iron gratings in front of them as "skirting." The fresh air to the hot-water pipes to be taken from outside the building along the two fronts and from the open wells.

Open wells of sufficient size are formed between all the internal courts, in a similar way to those between the present main courts. These wells, besides giving light and air to the basement, will afford a means of drawing fresh air direct into the internal courts, when required, and will also afford a supply of fresh air to the hot-water pipes direct, without long flues or chambers. The water-pipes from the roof would be carried down these wells, and thus be kept outside the building.

The extraction of vitiated air to be by means of flues formed in the walls from the various courts and galleries downwards to the basement, thence by flues under basement-ceiling to the four towers, and then led upwards to the top, where extraction-fans will expel the air. The fans to be driven by electric motors, thus insuring a definite ventilation in all states of the weather.

There would be no soil-drains inside the building. The present lavatory accommodation is well detached from the building, and should be sufficient for the whole building. As each additional lavatory would require an additional attendant, none has been added; but a cloak-room for ladies and gentlemen is provided at the north entrance, to which a lavatory could be attached if necessary, and one has been provided in the basement for attendants.

The present apparatus would be continued throughout the new building, with water-tanks in the towers in addition; hydrants and fire-hose being placed in all the courts and galleries. As a further protection from fire, an open space is left between the offices at the east end of the building and the adjoining property, so that the museum may be detached all round.

The design lends itself to two modes of material for the façades, viz.:—

1. Red brick with terra-cotta dressings and mosaic for the spandrels and panel decoration; this would give a rich effect of colour.

2. All stone or stone and red brick.

The grand central court and staircase would be of stone, and the grand Oriental court would be constructed with iron stanchions, encased in terra-cotta, and the roof principals, &c., of steel; all the other internal work would be in plaster, like the present building."

CITY BANK, LUDGATE-HILL.

THIS building is being erected as a branch of the City Bank. The ground-floor story is in Aberdeen grey granite, unpolished, but finished to a fine-axed face. The upper portion is in terra-cotta (made by Messrs. Doulton & Co.) and red brick (from the Cranley Brick and Tile Company). The carving and modelling is by Mr. Walter Smith, the builders are Messrs. Mowlem & Co., and the architect is Mr. T. E. Collcutt.

ARCHITECTURAL ASSOCIATION EXCURSION: PLACES VISITED.

WE give in the present issue some sketches in illustration of the excursion of the Architectural Association in Shropshire (which will be found described and further illustrated on another page). The sketches,—which include a general view and details of the gateway of Stokesay Castle, old houses in Shrewsbury, and a fine house, Park Hall, in the same district,—have been kindly lent us by Mr. H. D. Walton.

NOTES FROM ITALY.

THE Italian Government has decided that in the autumn the archæological excavations in the Great St. Bernard shall be continued on the site where, as is already known, are the remains of the temple of Iupiter Poeninus. The excavations will be directed by the Professors Ferrero and Castelfranco, and with them will be associated Professor von Dühn, of Heidelberg, and they will be conducted on the site where last autumn were discovered fragments of stone, marble, and tiles, which reveal the presence of ancient buildings, which have suffered from wanton destruction and from fire, as is apparent from traces on the remains.

The Temple of Jupiter was discovered from September 3 to 13 last, and was found to be of rectangular form. It was 11·30 mètres long on the sides, and 7·40 mètres at the ends. The walls of the temple were formed of slabs of calcareous stone, of the thickness of 80 centimètres. No remains of columns were found. No bricks were discovered. Instead of bricks large slabs of marble, of the thickness of 0·1 mètres, were used, and some also of the thickness of 0·2 mètres. In these large slabs are the settings or fittings for the iron cramps which kept them united. There were found also some fragments of cornices, of white marble.

The temple was covered by large tiles which were found in numbers amidst the earth, and many bore the marks of the manufactories from which they had been issued.

Neither in front of nor behind the temple were found traces of buildings. The excavations of this year will be directed to ascertain the topography of the ground in front of the sanctuary, in the southern part of the site.

The objects found consist of various fragments of figures of bronze, and some fragments of glass and of terra-cotta belonging to vases. The coins were numerous and interesting; among them seventeen were recognised as Gallic, twenty-nine as Roman; almost all were of the period from Augustus to the Emperor Theodosius I. A little piece of silver money was also found of the epoch of Charlemagne. All the objects were found inside the area of the temple and before and behind it, and were deposited in the small but interesting museum of the Hospice of Saint Bernard.

Such were the discoveries made in this first exploration, which discovered to us the plan of the temple consecrated by the Romans to the divinity of those Alpine heights. It is to be presumed that the building of this sanctuary was coeval with the making of the roads across the valley undertaken after the conquest of the Retia (15 B.C.), ten years previous to the conquest of the valley of the Dora Baltea, when the commencement of the German wars rendered it necessary to regulate the communications between the new city of Augusta Praetoria (Aoste) and the valley of the Upper Rhone, and also between Italy and the encampments on the Rhine. The temple, already in ruins, was completely destroyed at the end of the tenth century, when it was despoiled of its materials for the construction of the Hospice.

L. B.

SEVENTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

[Continued from page 147, *ante*.]

cracks, stopped all further vibration. He had built a barracks on the same kind of site, which was very irregular, having here and there pockets of soft ground and in other places spots of hard ground. Again, he laid in the crevices pieces of railway iron, but to form the floor he employed large man-of-war's cables cut into the required lengths, crossing and re-crossing one another, in all directions, and embedded in the concrete. There had been attempts to produce the same results without the use of cables, but they had always failed.

Councillor Hannam (Leeds) agreed with the suggestions for solid floors, and that wood blocks might be laid down for 6s. per yard of flooring, but it would be for the wood merely. The expense would always be a great difficulty in the way of the general adoption of solid floors. Concrete roofs also were very costly, and flat-roofed buildings always had an unfinished look. In the absence of high-pitched roofs, it would be necessary to carry their chimney-stacks to a much greater height. They would often require to be 14 ft. or 15 ft. high above the square of the building, and in most cases such a height would, with only our present resources, be practically impossible.

Sir Arthur Blomfield said he once had experience of the advantage of using iron bars in the same way as had been described by Colonel Seddon. When he (the Chairman) was a much younger man, he had the task of erecting a church on a very treacherous foundation between a railway and a river. It had given him a great deal of anxiety. He had tried various devices with but little success until he struck upon the plan of laying down iron bars near the bottom of the concrete. Since then he had observed no symptoms of its going further. He would now call upon Mr. Statham to reply.

Mr. Statham, in answer to the various speakers, said, with regard to concrete floors, he had only mentioned that one method of forming solid floors, because it was the least costly, and that consideration must be kept in view. He did not positively recommend flat roofs,—he only suggested them, but he could not understand how the weight of a flat roof would be more augmented by snow in winter than a sloping roof, the area of which must be greater than that of a flat roof, and on a quarter-pitch roof the snow lay the same as on a flat one. He was acquainted with Hyatt's book, but a reference to Kirkaldy's records would show that the recent patent referred to showed much better results.* His paper was not one on ventilation, and, therefore, he would not stay to refer to what had been said by various speakers on that subject.

* These were the iron and concrete beams patented by Mr. F. G. Edwards, the experiments on which, with sections of the beams, were given in the *Builder* for May 2 last, p. 344.

Hygiene in the Construction of Walls in Dwellings.

Professor Emile Trélat, Paris (hon. President of the Section), whose memoir was not printed, excused himself for being unable to speak English, and politely requested to be allowed to speak French,—for, indeed, he said he could not do otherwise. The builder sought, in building the walls of a house, to employ materials capable of resisting the various changes which took place in the atmosphere, and he would select such materials as might appear to him satisfactory for the purpose, not too difficult to work, and not too costly. All large towns followed an organic law of civilisation, which tended to make their populations more and more dense, *i.e.*, to limit the available free space within limits constantly narrowing. There was a consequent tendency to make walls less and less thick. Health considerations led men to defend themselves by walls against the rain, the wind, and storm, but there was another consideration which was not too obvious. Every inhabited house should be regarded as a workshop, which we were all trying to render unhealthy. The *rôle*, therefore, of the wall was double. It should (1) guarantee the interior space from the variations of the outer atmosphere, and (2) it should resist the infectious tendency which necessarily accompanied the action of the vital functions of the occupiers. The protection required was threefold,—mechanical, hygrometric, and thermic. Every wall was mechanically sufficient to guarantee us against the wind, but it might be far from either hygrometrically or thermically effective. There were great differences in the materials employed. The *grès* of Fontainebleau for example, a hard stone, is very permeable to humidity. If a wall of 80 centimètres (nearly 2 ft. 8 in.) were built of it, and exposed to a humid atmosphere, in twenty-four or forty-eight hours the humidity would have penetrated it as surely as it would a lump of sugar. If, on the contrary, the walls were built of stone of an igneous character, like granite, the rain would not pass. It was most desirable to employ only impermeable materials for the walls of dwellings. Thermic perturbations took place in the same way. We were always complaining in winter. That resulted from the too rapid passage of caloric from one side of the wall to the other. What was it we did sixty or 100 years ago? We clothed ourselves more warmly and built our houses with thicker walls. At the present day we were continually reducing the thickness of the linings of our coats and reducing the thickness of our walls. In order that isolation should be perfect, the walls must be so constructed that the caloric would take a sufficiently long time to pass from the exterior to the interior, or *vice versâ*, so that the outside temperature, with its frequent vicissitudes, might never modify the interior temperature beyond the ratio of change which is consistent with the maintenance of perfect health. Our modern dwellings were subjected to economic conditions, which had continually reduced the thickness of the walls of dwellings, and their capacity of isolation had become very small. That was a disadvantage the importance of which we must realise, and which the hygienic comfort of habitations required to be remedied. Our walls might be regarded as media through which battalions of little units of caloric, positive or negative, were constantly passing and repassing. These units of caloric should not be allowed to pass too rapidly. It would be necessary that during the most extreme and prolonged external deviations from hygienic temperature (both above and below) the deviating temperatures at points on the exterior face of the wall should not have time to reach the interior face before they were transformed by a change in the external atmospheric conditions into temperatures more nearly approximating to hygienic temperature, and had consequently begun a retrogade movement from the interior to the exterior. Thus we saw that a movement backwards and forwards was produced under the influence of the incessant variation of the external atmosphere in the matter composing the wall, but never reaching its interior face. This was the result to be attained during the longest deviations of the exterior temperature. A wall of that nature would need a capacity of isolation varying according to the latitude. When he (M. Trélat) first visited London thirty-six years ago, the City of London was a mass of small houses. Now, said the professor, you build with so much audacity (as you do everything) that you outdo us in the number of stories you put into your houses You have thickened your walls precisely as if you had been listening to my councils and were fulfilling my instructions. You have done the right thing, but for a wrong reason. I can give you praise, but not a diploma. Walls should be thickened so that they are not penetrable by gases (porous), nor penetrable by water (permeable), but they should not prevent that salutary chemical combination with oxygen which renders miasmatic emanations harmless. The eminent professor hurried on to the conclusion of his address, begging for four minutes more. Each of us, he said, should consider himself a manufacturer of unhealthiness (*fabricant d'insalubrité*),—of human miasma. Walls were either favourable or unfavourable to that manufacture. Through great blocks of stone miasma would not pass; cavities and porous materials might constitute a field of purification against miasma. All emanations of indoor life were causes of infection in the enclosing walls. Walls threatened to become receptacles of infection when they have contained for a long period the gases and effluvium which emanated from our bodies. The materials of which walls were constituted were more or less liable to be impregnated with and to retain these effluvia. Were they to choose materials for the construction of the walls of dwellings which were easily penetrable by gases, or should they, on the contrary, give the preference to impenetrable materials? The professor concluded amid the plaudits loud and prolonged of all the members of the section.

In the discussion which followed,

Professor F. R. von Gruber (Honorary President of the Section), speaking in German, said he did not desire to set himself up in opposition to the learned exposition of the subject which had been given by the eminent professor, but he desired to point out that both in England and France the greatest cause of the loss of heat in buildings was the number and size of the windows. It was well known that the transmission of heat through glass was more rapid and ready than through walls, and so long as it was the practice to use in our houses single windows, it was useless to increase the thickness of walls for the purpose of retaining the heat. The permeability of walls could not be separated from the question of ventilation. When change of air was perfectly provided for, and the air was properly warmed, then the question of the permeability or impermeability of the walls became important. Considerations like those which had been brought before them in the paper were applicable where the question of cost in constructing a house was not entertained; but these highly scientific considerations should not be pushed too far in the construction of dwellings for the poorer classes, where the question of expense must always necessarily be a primary consideration.

Dr. Spottiswoode Cameron (Leeds) thought that there was a danger, in excluding damp, of excluding another precious element, the oxygenating influence of fresh air, which largely took place through the permeability of walls. In many houses the means of ventilation were almost *nil*, but a certain amount of the deleterious gases got through the walls. Was there not a danger if we made the walls too impervious that we might not be doing as much harm as good?

Mr. Ralph Nevill, F.S.A., thought there was much cogency in the remarks of the last speaker. He did not agree with Mr. Seddon in his observations on a previous paper in favour of solid walls rather than hollow walls. Walls laid in loam would be almost impervious, but to make the walls impervious by increasing their thickness was useless, so long as in other parts of a room there was only a single pane of glass between the inmates and the open air. He was of opinion that windows should always be constructed in such a way that there should be an air space always between two sheets of glass forming the windows.

Mr. H. H. Statham said he was disposed to agree with the last German speaker that it was of no use to increase the thickness of walls while we had glass windows occupying so large an area of wall space. In England we were not accustomed to double sheets of glass, with an ½ in. air space between.

Mr. H. H. Collins said that Pettenkofer gave instances of houses for the working classes built of iron slag, which was supposed to be

impermeable. But such houses were found to be extremely uninhabitable, because, at certain seasons, water would be found running down the interior walls. The speaker agreed with Mr. Neville with regard to hollow walls, and, he would add, hollow windows.

Mr. W. P. Buchan (Glasgow) said he doubted whether the double window with ½ in. or 1 in. interspace would prove as effective as some of them anticipated. He knew a church in Glasgow where the windows were double and of large size, in which the cold was bitterly complained of. He was of opinion that experiments should be made in the period of winter to ascertain the proper interval between two sheets of glass in order to prevent the escape of heat. Half-an-inch appeared to him too little. The most effective interval was probably between ½ in. and 1½ in., or, perhaps, 2 in. It would be a great advantage to have the matter settled by careful experiment.

M. Trélat, in replying on the discussion, said he had guessed rather than understood the drift of the arguments. The speakers appeared to be of opinion that the loss of heat by windows would be so great as to neutralise the advantage of thickened walls. It was a question of degree, of calculation, of volume. The greater the windows, the thicker should be the walls. The fundamental idea was that the surrounding mass should be so ample and sufficient that the heating of a wall should not depend upon the withdrawal from the inmates of any portion of their animal heat. The body was found to give off a certain amount of gas. In order that one might not be suffocated, a current of air was necessary. The movement of the surrounding air was necessary in order to respire fresh air. When the proper balance was maintained, there would be no perturbation. He hoped that his remarks would not be misunderstood by his ancient colleague and general secretary at Vienna, the Chevalier Von Gruber.

The Sanitation of Theatres.

Mr. Lennox Browne, F.R.C.S.Ed., next read a paper on this subject. He said:—

When the Committee of this Section did me the honour to permit me to embody in a paper the information I possessed of the condition of our theatres, I felt it was desirable, notwithstanding the long and extensive experience of them that I had, that a careful and detailed examination of the principal buildings should be effected in order that any statements I might find it my duty to make, should be founded on exact and precise information.

Through the courtesy of the lessees and managers, I have been able, in conjunction with my friend Mr. Ernest Turner, F.R.I.B.A., to inspect no less than twenty of our London theatres, besides a number in the provinces. I had, indeed, made application to twenty-two metropolitan lessees, but in two instances, instead of the ready assent accorded me by the majority, I was met by peremptory refusal, on the ground that the lessees could not permit their theatres to be inspected, except, to quote the exact words of the secretary of one, "by the authorised authorities."

As to one of these theatres, its pent-up situation, its age,—over thirty years,—and its manifold sanitary imperfections in the front part of the house, may be taken as sufficient reasons for the objections to inspection of the back; but with regard to the other, I had hoped to be able to describe it as a theatre which, being one of the most recently erected, might be accepted as a type of what a small comedy theatre should be, in the same way as one is able to point to the English Opera House as a type of all that is best suited for the home of grand opera, and to the "Lyric" as an almost ideal theatre for the requirements of light comic opera. However, during a visit to the front, when I occupied a seat in the stalls, on the prompt side, a strong whiff of carbolic acid which assailed my nostrils each time the door to that portion of the auditorium opened indicated that the condition of the urinal in the adjacent lobby was far from perfect; and I further learned that another similar convenience opens directly into the pit; so one may assume that however well the building is constructed with an eye to the beautiful, and with all modern improvements for scenic display, the sanitary arrangements have not been equally successful in conception, or, it may be, in execution.

Of the twenty theatres which I did visit, it may be said at the outset that in many the arrangements, from a sanitary point of view, are the reverse of satisfactory; indeed, there is hardly one in which some fault may not be detected. But I am bound to testify that the defects are for the most part due to structural causes for which, when existing as part of an original plan, I am sure every member of this Section will agree that there is no excuse although the blame should rest rather with the architect than with the proprietor. On the other hand, I have the greatest pleasure in bearing witness that the managers have, with hardly an exception, endeavoured to overcome the difficulties of the situation by care and supervision. If they have not always been successful, it has been far less often from want of zeal on their part than from the ignorance and neglect characteristic of members of the lower branches of the theatrical profession, and especially of the working staff, who represent, for the most part, a low type of the artizan class. Against the results, however, of bad workmanship in the sanitary fittings, no amount of supervision of the employés is of much avail, and unfortunately in theatres, as in our own houses, instances of slip-shod and faulty work are by no means exceptional.

In the front of the house, among the audience, it is found that from the careless way in which sanitary appliances are used, they are not unfrequently getting out of order, or giving cause for complaint. With a large section of the public, and not by any means those occupying the cheaper seats, it would seem necessary to supply automatic flushers, or a staff of attendants specially to wait on them.

Most of our investigations were made on Sundays, for two reasons:—1. Because it was the only day on which I could give the time necessary, and was the one least likely to interfere with the working of the theatre. 2. Because on that day, better than on a week-day, one could gauge with a certain degree of accuracy the care that was bestowed on the household arrangements generally; for as a straw may show which way the wind blows, so such small matters as leaving the slops unemptied till the Monday may be taken as a criterion of the ordinary practice in regard to sanitary matters.

Another indication of no small value of the sort of sanitary care that is taken at a theatre is afforded by the arrangements for the removal of dust and rubbish accumulation. At several, all dust is removed daily; at others, not only in small or in provincial theatres, but in some of the largest London houses, heaps of refuse may be found, not at one, but in many corners.

I have not thought it necessary to make analyses of the air in these buildings, as I had at first intended, partly because this matter has been very carefully gone into by Angus-Smith and others, but chiefly because, given the cubic space, the number of occupants and of gas-lights, and the amount, or rather, too often, the want, of ventilation, deductions can be drawn sufficiently convincing as to the state of the air, without calling in the aid of the analytical chemist.

Much has been written on the duty of theatre proprietors to afford protection from the risk of fire or of alarms of fire; but the London County Council, in its elaborate requirements in this direction, seems to have completely ignored the far more important subject of the health, not only of the actors and actresses, but also of the general public. I say "more important" advisedly, as there is ample evidence to show that the time when fires are most liable to occur in theatres, is not when the house is full, but within two or three hours after the audience and company have left the building; whereas if the sanitary arrangements are faulty, the danger is a constant one; and this danger to health, while affecting the audience, must much more affect those employed behind the scenes, because they are compelled to be in the theatre for much longer periods, both for acting and rehearsals, and are there all the week round. Moreover, it is behind the scenes that insanitary conditions are to be found in their most objectionable form; and although from time to time more or less fitful interest has been excited by the rumour of a death or of a severe illness taken by some member of a London or a country company, any systematic sanitary investigation of that portion of the building in which the actor is specially engaged has not only been completely neglected, but its necessity has been practically overlooked. It is to this department, therefore, that I have made inquiry, and since my professional work for the last quarter of a century has brought me so directly into relation with members of the theatrical profession in all its branches, I can speak of the effect on their health with no uncertainty. Nor is this merely a question of affections of the throat, although they are bad enough and important enough to those with whom a sound throat is a *sine quâ non* of their vocation, for we find that the general health of the actor suffers to a very marked extent when he is compelled to breathe constantly the vitiated air of hot, crowded, unventilated, and ill-situated dressing-rooms; the lowered state of vitality predisposes him in a marked degree to bronchitis, pneumonia, phthisis, and diseases of the respiratory and circulatory organs generally, to dyspepsia, to so-called acute rheumatism,—if rheumatism, and especially acute rheumatism, be not in itself a form of blood-poisoning,—and to typhoid fever, deaths from which last are by no means uncommon among actors, especially in the case of members of touring companies. It is well known, also, that a craving for stimulants is set up by insanitary conditions of the respired air and surroundings of a man's work. Indeed, alcohol is often asserted,—it has never been proved,—to be an antidote to the poison of an unsavoury atmosphere or occupation, and the statement is frequently made as an excuse for indulgence.

But it must not be supposed that because I deal with those mysterious parts of a theatre behind the curtain, that it is the *employés* who are the only sufferers from insanitary conditions in those situations. It must, indeed, have been in the experience of many that when the curtain has risen, or a scene has been changed, and especially when the stage has been opened up, a rush of air of charnel-like odour has blown into the house; while the occurrence of theatre headache, theatre diarrhœa, and even theatre sore-throat, is well recognised as the not infrequent morrow's payment for an evening's amusement. Moreover, anyone with the least knowledge of theatres must be aware that there are certain theatres throughout the kingdom which are hardly more or less than veritable death-traps.

Whenever I have conversed with a member of the theatrical profession on the subject I have always been told of one or other particular provincial theatre which was especially condemned. Not a few buildings have been particularised by more than one informant, and one or two are *always* mentioned as prominently insanitary. It is, however, almost impossible for the actor to attack this mischief, because he belongs to a profession in which supply is in excess of demand, and it is even difficult for a manager. In one case with which I am acquainted, the London manager of a company, a member of which died from typhoid fever taken in a provincial theatre, was advised by his lawyer not to insist on legal proceedings, as it would greatly prejudice his having a date given him should he again desire to visit that town, and this prejudice might probably be shared by the managers of other provincial theatres who were conscious of similar sanitary shortcomings and dangers to health.*

In this connexion I may mention a case which happened in my own experience, and which throws a peculiar light on the legal view taken of our efforts to prevent disease. A young lady, who had on several occasions been under my care for attacks of sore throat of an undoubted sewer-gas type, while filling an engagement in a London theatre, was directed by her manager under the terms of her agreement to play at a certain theatre in the kingdom notorious as a source of typhoid. On learning the destination of my patient, I conceived it my duty to warn her of the danger to which, as one specially susceptible to the effects of foul air, she would be exposed, and I, at request, made an affidavit to that effect. The lady used my advice as a plea to release of the engagement, but when my declaration was read to one of the Judges of the High Court before whom the case came, he remarked that he did not see that a medical man was called upon to give an opinion of that kind until his patient had actually suffered! Had I been examined on my affidavit I should have ventured to point out to his Lordship that the efforts of a doctor to

* In the case of touring companies in the provinces there is, of course, the added danger of sanitary imperfections in the lodgings occupied; since, owing to prejudice, it is difficult in many towns to procure accommodation of the better class. Moreover, the fatigue of Sunday travelling and of constant rehearsals is apt to make individuals more "receptive" of malign influences on the health.—L. B.

prevent disease offer more probable chances of success than do our attempts to cure it when manifested, just the same as the best lawyer is not he who gains the largest number of successful verdicts, but he who, recognising the uncertainty of the law, settles the most cases without resource to a trial in court.

I am quite aware that in all probability my statement that an abnormally large proportion of theatrical ill-health is due to insanitation will be received with incredulity by the public, and met by opposition from the managers; such is, however, my sober conviction, and not only so, for there are certain houses, not only in the provinces, but in the metropolis, from which I am almost certain to receive as patients members of the profession who, in other engagements enjoy fair health.

To come now to a consideration of the actual state of affairs existing in our theatres, I would deal first with the question of their *situation;* and this has such a strong bearing upon the construction of the building in reference to proper sanitation that it merits our most careful consideration. How many of our theatres can claim perfect isolation? But few, and only those of quite recent erection, such as the Royal English Opera and the Shaftesbury. I am glad also to note that isolation will be made a feature of the new theatre which Mr. George Edwards is building; for without isolation it is well-nigh impossible either that the risk of fire, when arising in the theatre, can be limited to that building, or that conflagration from contiguity can be insured against.

Nor can there be thorough, or indeed sufficient, ventilation without isolation; for where there is,—as exists in several cases,—some sort of open space on one or other side of the building, the changed "air" is very far from "fresh," even when mechanical aids are employed; indeed, in very many instances it is actually vitiated, being drawn from some narrow slum or back court, used, may be, as a urinal, or lumbered up with disused stage properties. I am aware, of course, of the difficulties which have existed, and still exist, in the way of theatres being so perfectly isolated as will be admitted by modern hygienists to be necessary. Theatres, to be successful, must occupy central positions, and sites in such localities are difficult and expensive to obtain. Hence we find that a large number of our theatres have been erected on pieces of ground which must have taxed the ingenuity of the architect to a considerable extent in the preparation of his plans, and in at least three instances the difficulty of available site has been met by placing the theatres below the level of the street altogether, and in such a situation as to render efficient sanitation well-nigh a matter of impossibility. In an above-ground theatre, however hemmed in, it may be, by other buildings, space for dressing and retiring-rooms may be adequate or not, and windows are at least feasible, though they are by no means the rule; but in underground theatres and in rooms built under the stage, windows are either altogether absent or are of the order of a transparent ceiling, and of no practical value for ventilation. Moreover, in underground theatres there must be a constant difficulty with the drainage, where, as has actually been the case, the drains are placed at a lower level than the main sewer. It is fair to report that in two such buildings of this class attempts more or less successful have been made to remedy this grave defect,—a defect one would hardly expect to find in theatres built so recently, for one dates from 1882, the other from 1874. This last was reconstructed entirely, for causes of sanitation, in 1883. It is difficult to acquit the architect of blame in the first instance, for, with all respect to the profession, I do not think he should have consented to prepare plans on such lines. Even now such an event as percolation of sewage from an old brick drain is not an unknown occurrence under the stage in one of these reconstructed subsoil theatres. To demonstrate still further the difficulties met with in theatres built in cramped positions, I found it not an unusual position for water-closets to be in dressing-rooms or in hot lobbies (80 deg. Fahr. on Sunday morning) into which dressing-rooms opened, the only means of ventilation for the closets was into these rooms (diagrams 7, 8, and 10).* It is well nigh impossible to conceive that these arrangements were part of the original plans. While on this subject, I would point to another accompaniment which I consider objectionable in underground as in all theatres, and that is having other buildings, as restaurants, erected over or in close contiguity to them.

Applying this matter of situation to country theatres, it may be added that not only is there less excuse on account of cost for non-isolation, but that, as a matter of fact, very many of such buildings,—full of other sanitary defects,—cannot have this particular fault of over-crowding charged against them.

Accommodation.—Theatres which have been built during the last ten years show improvements in the dressing-room accommodation (Diagrams 1 and 2) over that provided in the older theatres; but much still remains to be done, and in only one can the arrangement be considered absolutely satisfactory (Diagram 1). In the very old theatres, especially the large ones, there are long underground rooms without either light or water. In one of the oldest we found a room employed for office purposes placed over a vault in which were three water-closets used by the working staff, all out of order, and in two of them the pans were full. At this theatre the fire-watch is the most complete in London, so that it is guarded against the only possibility of improving its sanitary defects; if it should take fire, it is to be hoped that it will be empty, as there would be very little chance for its safety, and with its wooden staircases and numerous passages, not much for those engaged on the stage. In some theatres, and especially large houses, there is an absence of a master-key by which all the rooms could be opened without delay in case of fire. This defect does not exist at either the Alhambra or the Empire. At one theatre we were informed that we could not enter several of the rooms occupied by principals because the rooms were locked and the keys taken away by their occupants. Such a statement can, however, be hardly credited.

While on this point of fire-watch, it may be remarked that at not a few theatres the fireman is a sort of ornamental appendage to the front of the house, and very ready to call a cab or run a message. I commend this circumstance to the attention of fire insurance actuaries, and to the successor of Captain Shaw.

In the later-built or reconstructed houses, such as the Adelphi, Vaudeville, Haymarket, Comedy, and St. James's (and this last, by the way, is the only theatre in which a plan of the drains is exhibited), there is good dressing-room accommodation, with sufficient air-space, ventilation, and light for the occupants. In some there is enforced permanent window and over-door ventilation (Diagram 3), in others mechanical means are employed. In hardly any of the theatres of more than five years' duration is there a constant supply of water to be found in the dressing-rooms; on the other hand, where arrangements for running water obtain, there also the basins were of good class and well-trapped.

But in another class of houses things are not in so satisfactory a condition. I refer to those places which were originally not intended for theatres, but were built as music or lecture halls, and have been since adapted to the purposes of comic opera or spectacular burlesque. The original requirements in regard to dressing-rooms were naturally not at all on a par with those of a theatre. All that was needed were a few small rooms to be occupied by one or two artistes at a time, who came in "turn," and would take the room vacated by those who had preceded them; consequently, when it was proposed to give spectacular entertainments the accommodation was found to be most incomplete, and, where additional houses could not be acquired, room was found below the stage.

In one such theatre we discovered fifteen or sixteen rooms below the stage, some even at a second level, and in only three of these were there windows. In two, I was informed, and for all I know in the third, these windows were of necessity kept shut because they opened into areas with grating coverings through which the staff and others were in the habit of urinating. One of these rooms measured 38 ft. by 7 ft. by 7 ft. 9 in. (Diagram 4), and was occupied by from sixteen to eighteen ladies, each of whom, therefore, supposing there were only sixteen occupants, had barely over 130 cubic feet of space enough to supply them with air, if it was originally pure, for about two and a half minutes, according to the estimate of 3,000 per hour; and the space given for each individual, which should include that for dressing-table, dressings, &c., would be something like 16 square ft., or an area of 4 ft. by 4 ft.

Another instance of imperfect accommodation is represented by the theatre originally constructed for the purposes of comedy with a small company, but later employed for production of comic opera with a company four, or it may be six, times as numerous. In this description of theatre, adapted from buildings not originally intended for dramatic representation, we found,—and, I regret to say, in many others,—closets either in or close to the rooms (Diagrams 5, 6, 7, 8, 9, and 10), separated in some instances only by a partition of match-boarding (Diagram 6).

The old pan closet has been retained even in one house otherwise well-nigh perfect, and a closet much advertised was repeatedly pointed out to us as the acme of completeness, albeit it is one which sanitarians generally would consider far behind the requirements of to-day. In one theatre a water-closet adjoined the dressing-room of a principal artist, and the fatal error was permitted of having the closet disused, though the cistern for the drinking water and a sink were situated in the same cabinet. Nor was it at all uncommon, when we came on a closet particularly badly situated, to be told, as a virtue of management, that it had long been disused. Needless to say, no one in these cases had thought it necessary to cut off connexion. Nor are the water-closets in the front of the house any better than, or, for the most part as good as, the majority of those at the back, and for the defects in their situation and for the utter absence of all ventilation the architects must surely be held responsible. In some instances it would appear as if no arrangement for such necessaries had been part of their original design, for we found them literally planted in such positions that the only source for fresh air (save the mark) or for exit of foul was an adjacent cloak-room, lobby, refreshment-room, or even a portion of the auditorium. That this statement is not exaggerated is proved by the plentiful dissemination of the odour of disinfectants, and, in fact, whenever a disinfectant is to be smelt, it may be accepted that it represents, not the antidote, but the disguise of a poison it has attempted to conceal by a more vigorous attack on our olfactory sense.

On the programmes of a newly-reconstructed theatre the particular form of disinfectant employed in the building is naïvely printed under the advertisement of the special musical organ used. In another, in which we found a water-closet in the ladies' cloak-room ventilating on to the staircase, and a second on to the passage lobby to the stalls, we were met in all parts of the building by a printed certificate of a recent date, and signed by a gentleman who added "F.S.I." to his name, that "the sanitary condition before and behind the curtain was (in his opinion) *satisfactory*."

I have alluded to an instance in which a water-closet behind the stage was contiguous to the flue of a restaurant under which the theatre was built. In another theatre a closet in the front of the house, which was, indeed, a part of the ladies' cloak-room, was similarly overheated, and no means of cooling existed except by opening the door which led to the passage for occupants of the boxes and stalls. The accommodation of this nature, even to Royal boxes, in more than one instance is faulty.

So much for the closets. I regret to say that the condition, and especially the situation, of the urinals behind the stage, are even worse. Sometimes there are none whatever for the working staff, so that accommodation is often sought for either against the walls and down the areas of the theatres themselves or at the adjoining "public."

In one of the earlier theatres that we visited, where, as was well known, many members of the company had been recently ill, we found a stand-up urinal situated beneath the stage at the back and centre. Openings in the stage flooring really exposed the urinal to view, and these openings were, in point of fact, the main sources for its ventilation. We should have hesitated to mention a circumstance so damnatory, and, as it might appear, so identifying of a particular theatre, were it an isolated example, but I regret to say that we found the same condition, with but slight, and in no sense extenuating, variations, in several other houses.

* The diagrams referred to in this paper will be found in Mr. Ernest Turner's paper which follows this one.—Ed.

In one, the urinal of the working staff was in the corner of the stage itself; the ventilation was, however, not entirely on to the stage, but into a fire-escape shaft, whence windows opened on to each half-landing of the staircase used by the company; how much of the malodorous air of this urinal was drawn from these windows into the dressing-rooms, and how much driven on to the stage by down-draft of cold would be a nice (?) point to determine.

Incidentally reference has been made to the extremely deficient ventilation of the working portion of most theatres. It is a pleasure to state that at the Alhambra and the Empire, where very large numbers of dancers, &c., are gathered in one room and have to make many changes of dress, the construction of the rooms and the ventilation,—which is of a permanent character,—are well nigh as perfect as they can be. In the smaller rooms of these theatres occupied by the "principals," especially when they are foreigners, every inlet for fresh or outlet for used air is carefully and almost hermetically blocked.

Lighting.—The electric light is now largely used behind the stage, but is often supplemented by gas-burners, because the *artistes*,—quite erroneously, as is proved by their absence in the Royal English Opera House and the Savoy,—insist that the electric current cannot supply sufficient heat for their purposes of "make-up."

Heating.—The absence of ventilation entails such an excessive temperature that the thought of any method of warming seems hardly to have occupied the mind of the theatrical architect of the past, and, except in the green-room, it is rare to find a fireplace in use in rooms behind the scenes, or even to find one at all.

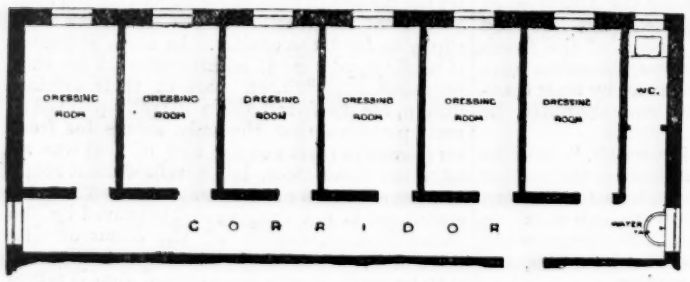


Fig. 1.

An excellent coil arrangement exists in Mr. D'Oyley Carte's new Opera House.

The foregoing remarks represent in almost the fewest possible words the outcome of our inspection. It is needless to add that a paper could have been written on any one of the many headings considered, and almost on any one of the theatres, which should have occupied the limit permitted to the whole. But, in point of fact, I have been able to take but a general survey, and perhaps this is as well in an opening paper; and I have, therefore, asked Mr. Ernest Turner to utilise a large quantity of the information we obtained as a separate contribution to this discussion, and have had pleasure in placing at his disposal the rough sketch plans made by me at our visits for the purpose of diagrammatic illustration.

I fear that my communication will be considered as representing a pessimistic view. From the aspect of the doctor it could hardly be otherwise; for in making a diagnosis one has rather to take note of what is diseased than of what is sound. But in making a prognosis one is permitted to place in the balance both the favourable and the unfavourable; and, so doing, I venture to prophesy a greatly improved sanitary condition of our theatres in the near future. Nor would I wish it to go forth that in my opinion the sanitation of theatres is any worse, except that large numbers of persons are occupied therein for a constancy of employment, than is that of concert-halls, conventicles, or institutions for the purpose of Christian association.

In conclusion, while I have been careful not to actually identify any theatre whose arrangements I felt it my duty to condemn, I have only named those possessing characteristics which it was no less a pleasure than a duty to commend.

Diagrams Illustrative of the Sanitation of Theatres.

Mr. Ernest Turner, F.R.I.B.A. next read the following paper explanatory of the diagrams alluded to in the preceding paper:—

The diagrams exhibited, twelve in number, are complementary to Mr. Lennox-Browne's paper, and, although they are not measured drawings to scale, they are accurate in so far as they illustrate types of good and bad arrangements at the theatres visited.

In considering the matter fairly, it must be borne in mind that the buildings represented are of very different dates, and the strong contrast which is presented between those of earlier and those of later date marks well the progress of sanitation, and will, I think, lead to the conclusion that many of the older theatres require their sanitary arrangements remodelled, amounting, in some instances, to an entire reconstruction of a portion of the buildings.

Diagrams Nos. 1, 2, and 3 illustrate three arrangements of dressing-rooms in relation to corridors and conveniences, the first two constituting part of the original plan of the theatre, the third, the arrangement in an added house.

No. 1 represents the dressing-rooms on each floor in one of the newest London theatres, and is in every way well planned. The corridor is well lighted, and cross ventilation is practicable when desired; the closet is well placed; the rooms are sufficiently large and lofty, and have good windows opening to the public street. The well-arranged presses and lockers with which the rooms are fitted, affording a place for everything, and security against loss, render it practicable to leave the doors of the rooms open when unoccupied, although, strange to say, advantage is not taken of such facility in the very theatre under consideration.

This latter point appears to me to be worth more consideration than it generally receives, both on the score of access for the fireman and of air flushing the apartments.

There are in this theatre several floors of dressing-rooms similarly arranged; and a hydraulic lift, which travels at high speed, conveys the performers to and from the stage. The perfection which has been attained in the construction and mechanism of lifts or elevators may be the key to the problem of providing adequate dressing-room accommodation upon what might otherwise appear to be inadequate sites.

No. 2.—Here the closets are placed at the ends of the corridors, and one over the other,—not an unusual arrangement in modern theatres, but necessitating at least a good air shaft, which is not generally to be found, but does exist in this house.

In many theatres it is difficult to believe that the closets formed part of the original plan of the architect; indeed, to the professional eye, there is strong evidence that they have been added as afterthoughts.

No. 3.—Although the dressing-rooms here are good, the corridor is only lighted by artificial light, and it is ill-ventilated. It may be thought that, as the buildings are chiefly occupied at night, the absence of windows in the corridors is of little importance. A visit to the theatres, and the difference that will be observed between the cleanliness and sweetness of corridors lighted naturally and artificially, will soon dispel such illusion. And whilst on the subject of cleanliness in corridors and elsewhere, let me draw attention to the many advantages which arise from the use of glazed bricks as internal wall surfaces. In a few of the modern theatres they have been freely used with most satisfactory results.

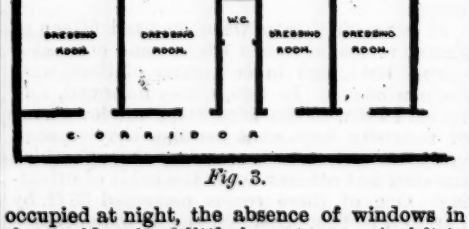


Fig. 3.

Nos. 4 and 5 represent two of the worst dressing-rooms seen by us. No. 4 is occupied by sixteen to eighteen girls, who have to remain

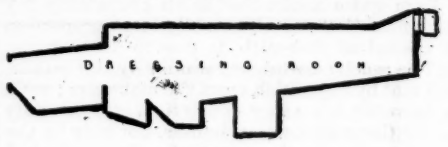


Fig. 4.

the greater portion of the evening in this room, which is under the stage, and practically unventilated. Having regard to the small amount of cubic space, the number of lights and occupants, and the impossibility of air renewal, such an arrangement must be condemned as highly insanitury. Indeed, it is nothing short of gross cruelty to compel human beings to occupy such a den.

No. 5 is another cellar dressing-room, in the same theatre, with piers and vaulted roof, almost, if not quite, as bad as the last, and has, in addition, a closet and sink in objectionable proximity. The legal definition of a "cellar dwelling" is "an underground room in which any person passes the night," and it is illegal to occupy such room unless certain regulations as to height from floor to ceiling, size and position of window, means of ventilation, &c., are complied with. These cellar dressing-rooms do not in any way comply with such regulations; but it appears that they may be occupied from six o'clock until twelve, although occupation from twelve to six would be illegal.

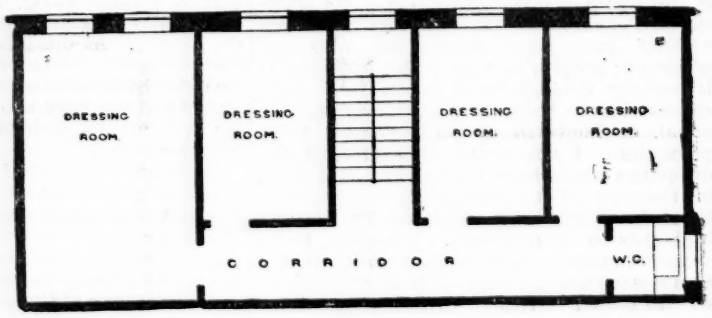


Fig. 2.

Turning for a moment from examples of bad arrangement, it is a pleasure to be able to speak of two metropolitan theatres where, in some of

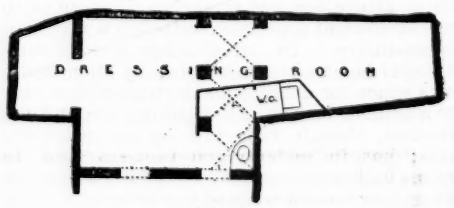


Fig. 5.

the dressing-rooms used in common by a large number of dancers and supers, there is not only ample cubic space in the large and lofty rooms, but excellent natural and artificial ventilation.

Diagrams Nos. 6, 7, 8, 9, and 10 illustrate faulty arrangements of closets in relation to dressing-rooms.

In No. 6, which is a portion of an added house, the closets on two stories are practically portions of the dressing-rooms, enclosed by match-boarding partitions only. One, which was very defective and offensive, was for the accommodation of about thirty people, and was partitioned off from a dressing-room 15 ft. by 10 ft., by 8 ft. high, occupied by three ladies.

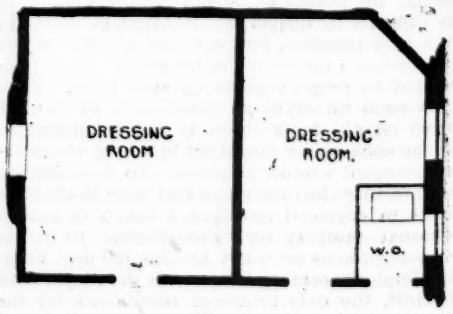


Fig. 6.

This arrangement reminds me of one lately found *in* the kitchen of an Italian restaurant in London, where the only convenience was enclosed by a canvas screen.

No. 7 shows an exceedingly bad arrangement of unventilated lobby, dressing-rooms, and closet. The air of the latter pervades these

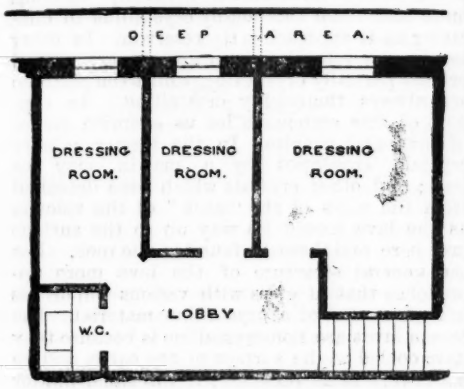


Fig. 7.

rooms and lobby, and, to intensify the evil, the heat from the boilers of an adjoining restaurant renders this unsavoury corner almost unbearable. It is true that each dressing-room has a window, but each window opens into a very deep and narrow area common to the restaurant above, and covered by a grating with small openings.

No. 8 illustrates an underground closet in connexion with dressing-rooms (occupied by four of the principal gentlemen of the company) and with staircase close to the stage;

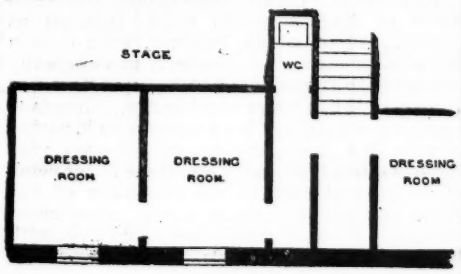


Fig. 8.

being without window to the open air, it necessarily pollutes the atmosphere of adjacent room, staircase, and lobby, and all the more so since, with the idea of ventilation, a small square opening has been made through the wall on to the staircase in question.

No. 9 shows another closet in the same theatre, again without window, open to the staircase and adjoining dressing-room, and situated under the cistern for drinking water, the draw-off being in the closet itself. This

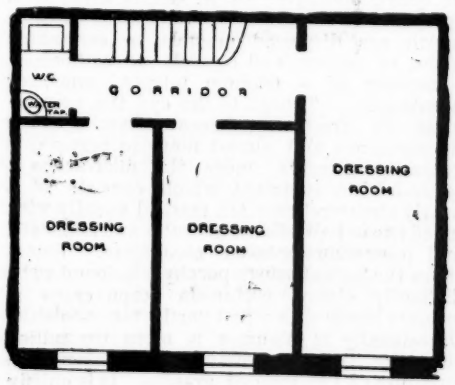


Fig. 9.

place, I was told, had been found so objectionable that, at the request of the occupants of the dressing-rooms, orders had been given that it was not to be used. No means had, however, been taken to cut off the connexion with the drain, and I need not explain to this section the probable result of the order.

No. 10 is an arrangement of closets good enough if they had windows opening into the open air, instead of, as is the fact, being without windows, and being open to the internal lobby over the door-heads.

No. 11 illustrates an unventilated closet in relation to a private box, showing what luxury is provided for those who can afford to pay for it; and No. 12, the arrangement of a ladies' cloak-room, this last being typical rather than unique.

In these few brief notes I have put some of the facts plainly before you, and I have confined my remarks almost entirely to the *plan* of the apartments mentioned, the plan of the building being, from an architect's point of

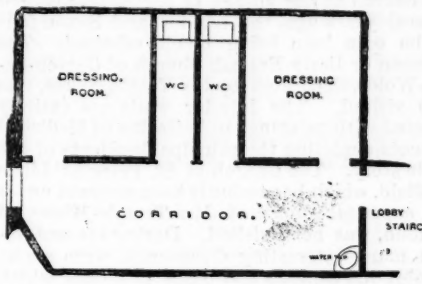


Fig. 10.

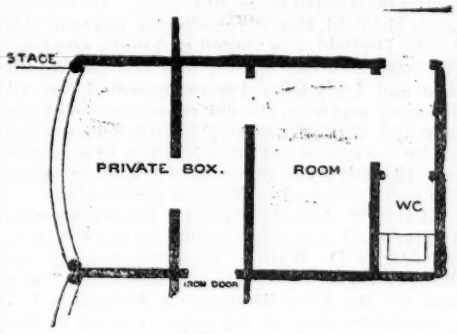


Fig. 11.

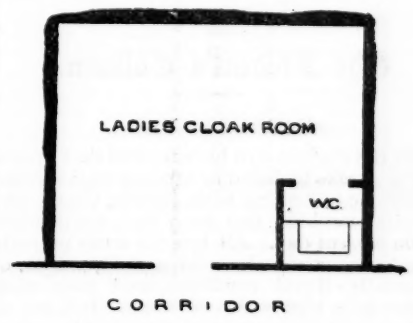


Fig. 12.

view, of primary importance, for, if this be imperfect, no subsequent so-called "sanitary engineering, however skilful, can make amends for the original defect.

I do not for a moment mean to imply that the introduction of modern appliances, good plumbers' work, and well-laid and ventilated drains, would not do much to improve the sanitary condition of many theatres; but, on the other hand, I feel sure that you will agree with me that many of the rooms are, from their position and surroundings, totally unfit for the uses they are put to, and that they call for abolition, re-arrangement, or re-construction.

With respect to overcrowding, one great difficulty seems to be that theatres built to accommodate small comedy companies are subsequently occupied by large companies playing burlesque and comic opera. It is obvious that whatever skill the architect may display in the original plan, and whatever control may be exercised in the official examination and approval thereof, are, in these circumstances, rendered nugatory.

In questions affecting the health of the community at large, or any particular sections thereof, Acts of Parliament and regulations are, doubtless, to a certain extent, necessary; but still more useful will be a widespread knowledge of hygiene—an appreciation of its economy and of the benefits it confers upon those who follow its teachings—a knowledge which it is the main object of this Congress in its various sections to promote.

It should be needless to say that it is solely in this spirit that my colleague and I have conducted these somewhat delicate investigations. We gratefully recognise, in the general consent of managers to our request to be allowed to visit their theatres, a desire on their part to march with the sanitary enlightenment of our days, and on this account, as well as from the evidences of improved construction in each new theatre which is opened, we may look hopefully to the future. We can but trust that this discussion will hasten the new era, and that the work of this section, and of the whole Congress, will help to bring the world at large to recognise that good sanitation, so long obstructed and regarded as a bore, is indeed a boon and a blessing free of hindrance or disguise.

In the discussion which followed,

Dr. Allan (Public Heath Medical Society), referred to the case of a theatre where, next to the box-office, and, doubtless, in close proximity to the place where the cakes and the refreshments were placed, the water-closet and lavatory were situated. In the Bayreuth Theatre they had an excellent model to follow. It stood clear in its own space of ground, and all conveniences and other buildings were quite clear of the main buildings. There was great room for improvement in concert-halls, and in some of the clubs. The ventilation in most of them was bad, and they would do well to follow the example of Dr. Lennox Browne and Mr. Ernest Turner, and track down the evils to their source and origin. If the London County Council would add to its self-imposed censorship on the morality of theatres and music-halls, the duty of securing proper sanitary arrangements, and would insist upon a clear space around the main building in all such cases, they would be really benefiting the community.

Mr. Walter Emden, architect, complained that while in foreign countries theatres and places of amusement were subsidised, in England they were penalised, and everybody tried to stop them. He thought those who expended their money in the business were as much entitled to the benefit of the protection of the law as other members of the community, and that they should not be harassed. He contended that isolation was not absolutely necessary. A more scientific treatment of sites would enable architects to obtain all the desirable security without insisting upon the necessity of isolation. With regard to the portions of some theatres below the ground level, the speaker contended that the placing of one tier underground was not only not injurious, but was positively advantageous. If a panic of fire occurred in a theatre it would surely be better to have to come down two staircases than four. A better division could hardly be found than commencing the main staircase at the level of the street, with the pit below and the upper circle and galleries above. Since ventilation would necessarily be effected from the top of the building, the placing of one tier below would make no difference. The heat in theatres was made a ground of complaint. Of course, it was hot in a theatre, as it was in any crowd whatever. If in the building of a theatre they tried to please everybody there would be no building at all.

Mons. F. Bouhon, architect (Member of the Commission on Unhealthy Dwellings, Paris), said he was astonished at not having heard conclusions presented by the readers of the papers. The arrangement shown in diagram No. 4 seemed to him the most typical of what to avoid. All Frenchmen coming to London,—the birthplace of sanitation,—were astonished to see so many cellars used, more or less, as dwellings. Even in great and handsome buildings they saw persons living in rooms below the ground. Cellar dwellings to a Frenchman were the most intolerable things that could be imagined. After the terrible fire at the Opéra Comique, in Paris, a law had been passed of a stringent character, one of the provisions of which was that there must never be any portion of the auditorium below the ground. Let England, which had so many living-rooms and kitchens below ground, take good heed of that new law.

Mr. Alderman Domville (Exeter) said that, as Chairman of Directors of a Theatre, so far as his experience went, he believed that while an architect had a free hand he would do all that science could require. The dressing-rooms in the theatre at Exeter, destroyed, remained untouched by the fire. The plan of the new theatre, which had been suggested by Mr. Irving, and carried out by Mr. Darbishire, was now on its trial. Like the Greek theatres, it had no gallery, the seats ranging tier upon tier behind one another, around a central point in the building. The audience did not yet like it, as the level of their heads reached only halfway up the proscenium. The tendency was for the modern theatre to become more and more like the ancient theatres of

Greece and Rome. He would ask, Had we not too many theatres? And he would suggest that now, the time of summer, was the time to be utilised for a good look round to see in what direction they might improve the plans of their theatres. Perhaps the new Public Health Act would help them. If County Councils would only undertake to see that our public buildings were constructed on the principles approved by modern science, they might depend upon the public itself to look after morality.

Dr. Dolan (Halifax) described some miserable dressing-rooms that he had seen in provincial theatres. He had in his mind one at that moment no larger than the reporters' table, in which the girls had to do all their changes and all their dressing. On one evening he was called to one of the girls who had a sprained ankle. He found no conveniences of any kind such as the circumstances required, no hot water and no cold water, except such as could be contained in a small tin can, and no conveniences for washing. The other dressing-rooms were in the same miserable condition. He had traced absolutely typhoid fever, loss of voice, and other diseases, many of them of an infectious kind, to the defective sanitation of theatres. The mills in Halifax were under regulation, and must be sanitary, and it was not too much to expect that proprietors of theatres should be under the same obligations as to sanitary provisions. Until the force of public opinion was brought to bear upon proprietors and managers of places of public amusement, the present miserable state of things would doubtless continue. He most cordially congratulated Dr. Lennox Browne and Mr. Turner on the admirable character of their papers.

Mr. Max Clarke, architect, said that the criticism to which theatrical proprietors and the builders and architects of theatres had been subjected he thought rather severe. The theatre of Bayreuth was on one floor. Ordinary criticism of architects might be treated lightly, but criticism from an authority like Dr. Lennox Browne was an important matter.

Sir Arthur Blomfield, the President, interrupting Mr. Clarke, said Dr. Lennox Browne had not criticised architects.

Mr. Max Clarke continuing, said greater air space was undoubtedly a good thing. It was great and rapid variations that were the cause of the diseases to which Dr. Browne had alluded. With regard to ventilation, he for one did not believe in fans. The *plenum* system was the only effective one for ventilation.

Dr. Lennox Browne, on being called upon to reply to the various speakers, said he could not agree with Mr. Emden, who said that isolation was not necessary. How could you get ventilation if there was no open space at the back? He could not follow the meaning of Mr. Emden when he said that ventilation was only possible from the top. In a theatre at Vienna there was a fan arrangement by which hot or cold air could be admitted from a valve placed under the seat, and either hot or cold could be turned on at the will of each individual occupant. He could not understand how Mr. Domville could claim as an improvement dressing-rooms where there was a water-closet at each end of the ventilating corridor.

Two o'clock having now arrived, the Section rose for the day.

[We will continue our report of the proceedings of Section VI., and of other Sections as far as possible, next week and the week afterwards.]

ARTISANS' DWELLINGS, OLDHAM-ROAD, MANCHESTER.—We understand that in this competition the first premium was awarded to Messrs. Spalding & Cross, the second to Mr. Walter R. Sharp, and the third to Messrs. Gibson & Russell. A competitor writing to us, however, complains that though it is understood that an assessor has been appointed and has given the award, they do not know the assessor's name, his report is not to be published, and the drawings are not to be exhibited. This is not at all as it should be. The assessor's name should always be published; how can the competitors have confidence in a person of whom they know nothing? And wherever a building competed for is of any size or importance, it is more satisfactory that the drawings should be exhibited and have the chance of public criticism. Where this is refused, and the assesor's report also kept a secret, it is no wonder that competitors should feel dissatisfied.

ARCHITECTURAL SOCIETIES.

YORK ARCHITECTURAL ASSOCIATION. — On Saturday afternoon, the 15th instant, a number of members of this association visited Driffield, the object being to inspect some of the restored ancient churches in that neighbourhood. The party proceeded in conveyances, and inspected the church at the village of Kirkburn, restored several years ago, the reredos and Saxon font to be seen here being much admired. The Norman or Early English church of Garton-on-the-Wolds, decorated by Sir Tatton Sykes, was also visited. The interior walls are entirely covered with paintings in imitation of Mediæval frescoes depicting the principal incidents of the Bible story. The Church of St. Peter at Little Driffield, which has recently been restored under the superintendence of Mr. Temple-Moore, of London, was next visited. During the restoration many interesting discoveries were made, notably the capitals and bases of pillars, which showed that at one time a church stood here having both north and south aisles. On leaving Little Driffield, the Perpendicular tower of All Saints, Driffield, was visited and much admired. The interior of the church and the new north aisle and Lady Chapel were inspected, but all this work was new, the entire restoration of the nave and chancel recently having been carried out by the efforts of Canon Newton, at a cost of over 12,000*l.*, from plans by Sir Gilbert Scott. The party returned to York in the evening.

GLASGOW ARCHITECTURAL ASSOCIATION.—At the usual monthly meeting on the 4th inst., Mr. Henry D. Walton, Vice-President, in the chair, a paper on "Roman Architecture" was read by Mr. Allan Graham. A discussion followed the reading of the paper, opened by Mr. E. A. Sutherland.

The Student's Column.

MARBLES.—VIII.

THE student will have noticed that several rocks included as igneous were alluded to in dealing with Roman, Greek, and Egyptian marbles; and many such are polished at the present day. All igneous rocks properly so-called have once been in a fluid, plastic, or potentially-liquid condition, and they then existed in a highly heated state. It is out of our province to describe the various processes by which they were rendered potentially-liquid, but the student must be asked to believe that when in that state they were some depth from the surface of the earth, a considerable amount of water was present (kept fluid by well-known laws), and that in its attempt to fly into the gaseous form it exerted considerable force. It represented so much stored-up energy, waiting to be released; and on being suddenly relieved of a certain amount of pressure of the superincumbent rocks, or on partially overcoming their weight, it did its best to force its way, together with the molten rock, to the surface. If successful, and the molten matter reached the surface, a volcano was formed; if only partially successful, a number of sheets of the molten matter were injected into the superincumbent rocks alluded to, and thus formed what are known as volcanic dykes and veins.

From the foregoing it will be perceived that igneous rocks may be conveniently divided into two groups:—

1. Plutonic.—Those formed and consolidated at some little depth from the surface of the ground,—including granites, syenites, diorites some porphyries, &c.

2. Volcanic.—The ejectamenta from volcanoes, lavas, and similar kinds of rock found in the necks of old volcanoes, and ramifying as veins through other rocks,—including basalt, dolerite, &c.

From the manner in which they have formed it follows that no sharp line can be drawn between these two groups. Those which consolidated at some little depth are truly plutonic, and those which reached the surface and poured out as lavas naturally fall with facility into the classification here laid down; but others there are which, being intermediate in character, partake of the nature of both, and are correspondingly troublesome to deal with. It will readily be understood that the whole of, the known plutonic rocks and volcanic dykes and veins have been bared for our inspection by denudation of one kind or another. In many instances, several thousands of feet of strata must have been disintegrated in uncovering the more deeply-seated plutonic rocks, and this enables us to form some idea of the powerful nature of denuding agents when spread over enormous periods of time. From an examination of ancient volcanoes in various stages of dissection, it is found that the rock which flowed out at the surface as a lava, when traced downwards, generally becomes more and more thoroughly crystalline in character as it approaches its reservoir. In other words, the volcanic group are non-crystalline, or only partially crystalline, whilst the plutonic are always thoroughly crystalline. In support of this statement let us examine pieces of lava and granite. In the former, minute crystals enveloped by a matrix may be seen; and other crystals which were detached from the sides of the "neck" of the volcano as the lava forced its way up to the surface may here and there be found in the rock. But the general structure of the lava more approaches that of glass with various impurities in it than that of a crystalline material. The reason lavas are non-crystalline is because they have cooled at the surface of the earth, and so under very little pressure; if the same matter had consolidated at greater depths within the crust of the earth, the superincumbent rocks would have exerted a much greater pressure upon them, and they would, consequently, have become more crystalline. This condition of things would go on until the materials, being very deep-seated, would, on solidifying, form a thoroughly crystalline rock, *i.e.*, one having no glassy matrix whatever. If we now take a piece of granite, or syenitic rock, such as many of the ancient Egyptian obelisks and statues are made of, we see that the structure of the stone in every way corresponds to our description of a plutonic rock.

Porphyry is a generic term applied to several kinds of igneous rocks when polished as marbles, all of which, however, have certain features in common. The term was originally restricted to stones of red and purple tints, but is now of much wider significance. Generally speaking, a porphyry is an igneous rock, having a very fine homogeneous ground-mass with large crystals here and there, these latter being of a different tint to the remainder of the stone, and showing up in a very conspicuous manner. When a granite has a fine base, with large orthoclase* crystals in it, it would be known as a porphyritic granite.

Many ancient and modern marbles are in reality porphyries, and the group is important enough for our purpose to warrant a rather detailed description. Under the title quartz-porphyry are included several varieties of rock which agree in consisting fundamentally of a very fine-grained felsitic ground-mass, composed mainly of orthoclase and quartz. Where these minerals are crystallised in conspicuous forms, the rock is a quartz-porphyry; where the whole mass is more homogeneous and flinty in texture it is a felsite or felstone. Speaking of quartz-porphyry, Sir A. Geikie says† it is composed of a compact ground-mass through which are dispersed crystals, or crystalline blebs, of quartz, and crystals of orthoclase, sometimes of a triclinic felspar, mica, or hornblende. Though to the eye the ground-mass in fresh specimens often appears homogeneous and almost flinty in texture, it generally presents under the microscope a micro-felsitic structure, which consists of a nearly structureless mass marked usually with indefinite or half-effaced granules and filaments, and possessing peculiar characters. Sometimes the base of quartz-porphyry is found to be distinctly glassy, whilst in other cases it appears partly glassy and partly micro-felsitic. Occasionally it assumes a more crystalline character, even sometimes recalling the structure of fine-grained granite. It is chiefly dispersed orthoclase which gives the distinctively porphyritic aspect to the rock. Mica and hornblende are the common accessory minerals.

The colours of quartz-porphyry depend chiefly upon those of the felspar, which varies from flesh-red to purple and slate-grey. When the base is very compact, and the felspar crystals well defined, and of a different colour to the base, the rock sometimes takes an

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* Orthoclase and other minerals alluded to in this and following articles having been previously described in these columns when dealing with "Building Stones and Stone Quarries," it is unnecessary to re-describe them in detail on the present occasion, but their chemical composition and colouring matters will subsequently be dealt with.

† "Text Book of Geology," 1882, p. 135.

excellent polish, forming the well-known porphyry of commerce.

One of the most porphyritic rocks in this country is found in Cornwall, where it is known as elvan, though all elvans are not porphyritic. A glance at a geological map of that county clearly shows that elvan dykes extend with scarcely a break of continuity from one granite boss to another. Their formation during the consolidation of the uppermost portion of the granite admits of little doubt; they are geologically considered to be of the same age as the granite. Some of these elvan dykes possess a characteristic granitic structure, and frequently acquire a greater width as they approach the granite referred to. Elvan has the same chemical composition as the granite from which it proceeds, but its aggregation and structure, though probably identical at the bottom of the fissure, becomes less and less granitic *pari passu* with remoteness from the main mass of granite. The student will readily understand from these remarks that Cornish porphyries differ widely in structure and appearance even though they may have approximately the same chemical composition. They form some of the most beautiful marbles in the country, and it is to be regretted that they are not more largely worked.

Orthoclase porphyry is composed of a compact porphyritic ground-mass, with little or no free quartz, but through which are often scattered numerous crystals of orthoclase, sometimes also a triclinic felspar, black hornblende, and flakes of black biotite. This rock is sometimes termed syenite-porphyry, since it is associated with syenite much in the same way that elvan is with granite. But this name should be retained for the finely crystalline varieties only.

Diabase porphyries are characterised by a fine or granular matrix, consisting of triclinic felspar and augite, and the same minerals also constitute the porphyritic crystals which occur in this matrix. Quartz is not of common occurrence in these rocks. Verde antique is a diabase porphyry.

Diorite is a crystalline granular mixture of triclinic felspar and hornblende. The majority of diorites are quartzless; when quartz does occur, the stone is known as quartz-diorite. These rocks have been polished as marbles in divers countries.

Of the volcanic rocks, but few are raised in the manufacture of marble. They frequently form excellent road-metal, and, as we have seen, were conspicuous amongst the ornamental stones of the ancients. Their sombre hues, however, with but few notable exceptions, are against their employment for decorative purposes nowadays. Basalt is, perhaps, the best-known rock of this group. Professor Hull states that amongst the Egyptian antiquities in the Museum at Naples is a remarkably truthful figure of a negro, the only human subject for which a basaltic statue appears suited.

Basalt is essentially a black stone, the component minerals of which can only be observed with the microscope, unless where they are scattered porphyritically through the mass. Dolerite includes all the larger-grained kinds of basaltic rocks in which the component crystals can be readily distinguished by the naked eye. Felspar is usually the most conspicuous ingredient; prisms of augite and minute crystals of magnetite are essential. Basalt rocks appear as lava streams, sheets, dykes, and veins.

SURVEYORSHIPS.

Surveyorship to the Worshipful Company of Skinners.—We are informed that out of forty-eight candidates who sent in their applications for this post, the Court have appointed as their Surveyor Mr. W. Campbell Jones, A.R.I.B.A., of London.

GENERAL BUILDING NEWS.

New Wesleyan Centenary Chapel at Heswall, Cheshire.—On the 13th inst. this chapel was formally opened, in the presence of a large congregation, by the Rev. Charles Garrett. The building provides accommodation for about 325 adults, and consists of nave, transepts, ond chancel, with minister's vestry and other conveniences at the rear. The style adopted is Perpendicular Gothic, and the buildings are faced externally with local red sandstone, rock-faced in narrow courses, the windows and dressings having tooled faces. The heads of all windows are filled with tracery, and the glazing throughout is of tinted cathedral lead-lights. There is an octagonal bell-turret at the right of the main gable, from which it is corbelled out, and carried upon red granite shafts. The internal woodwork is of pitch-pine, varnished, the external work being of red pine, painted four coats. The roofs are slated with the best slates in alternate red and blue bands. The total cost of the buildings, exclusive of seating, which has been transferred from the old chapel, is within 1,400*l*., including heating and water-supply. The contract has been carried out by Mr. John Shaw, from the designs and under the superintendence of Mr. Thomas W. Cubbon, architect, Birkenhead.

Cathedral Restoration at Dunblane.—During the summer months rapid progress has been made with the mason work. The choir, which has been the place of worship for many years, has given more anxiety to the restorers than the nave, which has been roofless until now for three centuries. It was found that the tops of the choir wall were more decayed than was expected, and part had to be taken down and rebuilt. This being now finished, the external appearance looks complete. In the south wall of the choir there are six large windows, and the tracery on the top of the four in the centre has been altered to correspond more exactly with what is considered the original. The east gable, containing the great east window, has also now a complete appearance, being surmounted on both sides by a small turret or spire.—*Scotsman.*

Extension of Aberdeen Fish Market. — The Works Committee of Aberdeen Harbour Board had before them on the 17th inst. a plan by the Harbour Engineer showing an extension of the existing fish wharf to the graving dock, a distance of nearly 560 ft., at a cost of 3,400*l*. It was proposed that it be extended only 300 ft., but, on a division, eight voted for carrying the wharf the whole way to the graving dock. It was unanimously agreed to keep the wharf 100 ft. back from the level of the graving dock, thus giving 660 ft. of new wharfage.

Primitive Methodist Chapel, Halifax.—A new Primitive Methodist Chapel in Queen's-road, Halifax, which is to take the place of the school-chapel hitherto occupied in Gibbet-road, has just been opened. The total cost of the premises, including the land, is about 6,300*l*. The chapel, which is in the Gothic style, has its principal elevation to Queen's-road. It will seat about 500 persons. There are no galleries, but a recess is provided at the west end for the organ and choir-stalls, the pulpit or rostrum being immediately in front. The organ has been rebuilt and redecorated by the makers. The woodwork throughout is of pitch-pine. At the west end of the chapel are school premises. In addition to a large assembly-room, there are seventeen class-rooms and an infants' school-room. On the Lemon-street side is a lecture and preaching room. Mr. James Farrar, of Halifax, was the architect.

Reconstruction of St. Mary's R.C. Cathedral, Edinburgh. — In the end of March last, warrant was granted by the Edinburgh Dean of Guild Court to make alterations on St. Mary's Roman Catholic Cathedral. Considerable progress has now been made with the work, and on the 15th inst. the foundation-stone was laid. The side chapel recently destroyed by fire, together with the vestry behind it, are to be formed into an aisle and new vestry, and a corresponding aisle will be constructed on the other or northern side of the nave. The present side walls of the main building are being removed, and their places taken by Gothic pillars, with Gothic arches intervening for the support of the roof. One effect of these alterations will be to double the accommodation of the Cathedral, and make it capable of seating about 2,000 persons. It is also contemplated at some future time to throw the present chapel-house into the main building, so as to extend the church backwards from the present altar; and also to erect two square towers at the opposite, or Broughton-street end. The work in all will cost £9,000. The plans have been prepared by Mr. John Biggar, architect.

Cottage Hospital, Bromsgrove.—On the 4th inst. the Earl of Coventry, Lord-Lieutenant of Worcestershire, opened the New Cottage Hospital at Bromsgrove. The foundation-stone of this building was laid in October last by Mr. John Corbett, M.P. The architect was Mr. John Cotton, of Birmingham. The buildings consist of a central block and two side wings connected by corridors. Most of the building, except the central part, is one story high.

Church, Hamstead, Stafford.—The foundation-stone of the new Church of St. Paul, Hamstead, Handsworth, was recently laid by the Hon. A. C. G. Calthorpe. The site is at the junction of the Old and New Walsall Roads, and the entire cost, including seats, heating-apparatus, &c., is estimated at 3,500*l*. The tender of Messrs. J. Harley & Son, Smethwick, has been accepted for the erection in the first instance of the nave, amounting to 2,336*l*. The plan adopted by the architect, Mr. William Davis, of Birmingham, is the form of the cross, with nave of moderate width and wide aisles. The floor will be laid with Minton's tiles. The footpace to the altar will be raised seven steps. The roof will be covered with tiles so as to match the schools. Two vestries will be placed on the south side of the church and the organ-chamber on the north. The north and south aisles will be 3 ft. 3 in. wide and the centre aisle 4 ft. wide. The church will accommodate about 450 persons.

Re-opening of Marr Church.—On the 14th inst. the church at Marr, near Doncaster, was re-opened after being closed for some months for restoration. The work has been carried out under the direction of Mr. C. H. Fowler, architect, Durham, and the cost has been about 800*l*. A new open-timbered roof has been placed over the nave, and a waggon-headed timber roof over the chancel. The gallery in the nave has been removed, and the space under the tower opened out and a screen erected, forming a bell chamber and vestry. The nave has been reseated throughout, and the flagging renewed. New choir stalls have been fixed.

Institute Building, Woodhouse, Leeds.—The Misses March, of Leeds, having offered to defray the cost of erecting an institute in connexion with the church and schools of St. Mark's, Woodhouse, the corner-stone of the building was recently laid. The site chosen is in Cathcart-street, facing Woodhouse Moor. On the ground floor there will be a reading-room, 28 ft. by 18 ft.; a recreation-room, 28 ft. by 20 ft.; a small lecture-room, a tea-room, a committee-room, lavatories, cloak-room, &c., together with apartments for the carstaker. On the first floor there will be a large lecture-hall, 70 ft. by 39 ft. 6 in. This room will be approached by two separate staircases, and have a large platform at one end. In the basement will be the heating-apparatus room and a covered playground. The latter will be lined throughout with white glazed bricks. The building is to be of red pressed bricks, with Bradford stone dressings. The windows in the two principal elevations will have moulded jambs, transomes, and mullions. In the west elevation, which is gabled, are to be two oriel windows of stone, with moulded jambs, mullions, and transomes, and embattled cornices. The gable above these windows will be enriched with diaper brickwork. The windows on the first floor will be gabled. There are to be two entrances to the building in the main front. The lecture-hall will accommodate 600 persons, and have an open roof with hammer-beam bindings. The windows internally will have quoined stone jambs and mullions and be filled in with cathedral glass in lead-work. There will be a framed, panelled, and moulded dado, with a moulded and embattled cornice. The whole of the internal woodwork will be stained and varnished. Messrs. Smith and Tweedale, of Leeds, are the architects, and Mr. Councillor Thomas Hannam is the contractor for the works, excepting the heating, which will be by Mr. Edwin Oldroyd.

Club Premises, Leeds.—The Mayor of Leeds (Mr. Alf. Cooke) opened on the 14th inst. the Hyde Park Recreation Club, which is situated in Ash-grove, Victoria-road, Headingley. In the basement, which is on a level with the bowling-green, there are the caretaker's rooms, cellars, a green-room (opening on to the bowling-green), secretary's office, &c. The chief room on the ground floor is the billiard-saloon. On the other side of the entrance hall are the reading and card-rooms. Round the billiard-room is a balcony, from which a good view of the grounds is obtained. On the first floor there is an assembly-room, measuring 55 ft. by 24½ ft., with ante-rooms adjoining. More rooms for the caretaker are situated on the second floor. The extensive grounds comprise a large bowling-green, a quoit-ground, and five lawn-tennis courts. Mr. W. A. Hobson, of Leeds, was the architect. The contractors for the erection of the building have been,—Brick and stone work, Mr. W. Evans; carpenter's and joiner's work, Messrs. Joshua Ledgard & Son; plumbing, Mr. H. Boston; slates, Mr. J. Season; painting, Mr. W. Walker; plastering, Mr. H. Pearson; and hot-water apparatus, Mr. Alf. Beaumont.

A New Church for Harden, Yorkshire.—On the 1st instant the foundation-stone of a new church for Harden, near Bingley, was laid. The church will be in the Early English style, with nave, chancel, and north aisle. The architects are Messrs. Healey Bros. of Bradford. The total cost of the church is estimated at 2,050*l*. and when erected it will seat about 250 people.

Church, West Seaton, Cumberland. — The foundation-stone of the new church at West Seaton was laid on the 30th ult. by Mrs. Blanshard. The church is to be built of white Lazonby stone, with warm red stone dressings. It will consist of nave, chancel, and transept, with organ-chamber and vestries. At the south-west angle it is intended to raise a square tower with the belfry and ringing-chamber 52 ft. high. The western gable will be pierced by a pair of double lancet lights, surmounted by a rose window. The principal entrance will be at the foot of the tower, but there is another door at the juncture of the transept and nave walls on the north side. The church will be lofty, with open panelled and boarded roof, and will accommodate 392 worshippers. Mr. G. D. Oliver, of Carlisle, is the architect. Messrs. Lister, McCartney, & Lister have the contract for the mason work; Messrs. W. & H. Davidson, Carlisle, the joiner work; Mr. D. Bell, Cockermouth, plumbing; Messrs. Ormerod & Sons, Carlisle, plastering; Mr. Mandale, Maryport, slating; Mr. R. Westray, Carlisle, painting and glazing. The total cost of the church will be about 4,000*l*.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised	Premium.	Designs to be delivered.
*Mission Church, Heath Town	The Committee	.....	Sept. 29
*Additions to Municipal Buildings	Bath Council	100*l.* 75*l.* 50*l.*	Oct. 10
*Christ Church Cathedral, Victoria, British Columbia	Building Committee	750 dols. 500 dols. 250 dols.	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Alterations, &c. to Gilfach Goch Schools	Llantrisant Sch. Bd.	J. J. Evans	Aug. 25
*Town Hall, Police Courts, &c.	Morley Corporation	Holtom & Fox	Aug. 26
Banking Premises, &c. Keighley	Bradford Dist. Bank Lim.	W. & J. B. Bailey	do.
Enlargement of Blackpool School, Ilsington	.....	W. Mortimore	do.
Drainage Works	Mold Sch. Bd.	F. Bellis	do.
Water Supply, Malpas	R. S. A.	G. Hodson	do.
Business Premises	Tylorstown Co-op. Soc.	T. R. Phillips	Aug. 27
*Pointing Walls, &c. Newington Workhouse	St. Saviour's Union	*Official*	do.
Residences, Barry Island	Barry Railway Co.	Richards & Gethin	do.
School Buildings, Kineton	The Managers	F. Trepess	do.
*Main Outfall Sewers Works	Ystradyfodwg L. B.	J. W. Jones	do.
*Supply of Granite	Gravesend Corp.	*Official*	do.
*Alterations to Schools, Plashet	St. George-in-the-East Guardians	Wilson Son & Aldwinckle	Aug. 28
*Four Houses, &c. at Galloway	Admiralty	*Official*	do.
*Broken Granite	Walthamstow L. B.	do.	do.
School, Pontshonorton, Pontypridd	Eglwysilan Sch. Bd.	T. Rowland	do.
Alterations, St John's Church, Bridgetown	Rev. A. J. Everett	W. M. Tollit	do.
School House, Frampton Cotterell	.....	A. Barratt	Aug. 29
Tar and Liquor Tank, Burton-on-Trent	.....	F. L. Ramsden	do.
Painting required in Parks, Halifax	Halifax Corporation	E. R. S. Escott	do.
Sixty Dwelling-houses, near Aberdare	Building Club	.....	do.
New Street, Nairn	.....	Gordon & MacBey	do.
Private Street Improvement, Blaengarw	Ogmore & Garw L. B.	H. Dawkin Williams	Aug. 31
Sewer, Mannamead, Devon	Compton Gifford L. B.	J. C. Inglis	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Constructing Road and Sewer, Acton	.....	Maddox & Son	Aug. 31
Making New Road	Halifax Corporation	E. R. S. Escott	do.
Laying Cast-iron Water Mains	Corporation of Stafford	W. Blackshaw	do.
Paving, &c. Works, Stafford	do.	do.	do.
Junior School and Laboratory	Sunderland Sch. Bd.	.....	do.
Free Library, Leominster	.....	F. R. Kempson	do.
Premises, Park-place, Cardiff	The Park Hall and Hotel Co.	T. Waring & Son	do.
Stone Arched Bridge, &c.	Abergavenny High. Bd	J. Gill	do.
Parsonage House, Kenfig Hill, nr. Bridgend	Rev. J. B. Davies	Halliday & Anderson	do.
*Granite and Whinstone Setts	York Corporation	*Official*	do.
1,300 tons of Limestone	Gelligaer Highway Bd.	W. Bevan	Sept. 1
*High Level Sewer, &c.	Belfast Corporation	*Official*	do.
Stores, Stables, and Cartshed	Plymouth, Devonport, & Stonehouse Cemetery Co.	.....	do.
*Sixty-eight Dwelling-houses in Flats, &c.	N. E. R. Co.	W. Bell	Sept. 2
*Works at Infirmary and Workhouse	Lambeth Guardians	T. W. Aldwinckle	do.
Forty-six Houses, Danygraig, Pontypridd	.....	T. R. Phillips	do.
*Iron Bedsteads	St. Olave's Union	*Official*	Sept. 3
Wrought-iron Ship Caisson	Bristol Docks Com.	J. M. McCurrich	Sept. 4
Street Works, Sevenoaks	Local Board	Jabez Mann	do.
*Sewerage Works	Reigate R.S.A.	J. Anstie	Sept. 8
Strengthening Portion of Town Quay	Southampton Harb. B.	J. G. Poole	do.
*Removal of Blake's Bridge, &c.	Reading Corporation	A. T. Walmisley	Sept. 10
*Stables, Shedding, &c.	Oxford Corporation	*Official*	Sept. 12
*Making-up Roads	Hornsey Loc. Bd.	T. de Courcy Meade	Sept. 16
*Public Hall and Offices	Borough of West Ham	Lewis Angell	Sept. 22
*Tunnel under River Thames, Blackwall	London C. C.	*Official*	Oct. 13
Additions, &c. to Residence, Roundhay	.....	Richardson & Simpson	No date
Laying-out Football Ground, Roath	.....	C. Taylor	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Manager of Sewerage Farm	East Barnet Valley Loc. Bd.	2*l.* 2*s.* &c.	Sept. 4
*County Surveyorship, Ireland	Civil Service Comms.	.....	Sept. 24

Those marked with an Asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., *and* viii. *Public Appointments, p.* xviii.

EXTENSION OF ATHENÆUM BUILDINGS, GLASGOW.—Plans for the extension of the Glasgow Athenæum buildings, situated in George's-place, Glasgow, have recently been passed at the Dean of Guild Court. The new building, which will occupy the site of the old Religious Institution Rooms, will have a frontage of about 45 ft. to Buchanan-street, and will extend along St. George's-court about 86 ft. The entrance is at the north corner of the site, and a staircase, oval in plan, with an elevator in the centre, gives access to the various floors, with a service elevator at the angle of the stair, taking the place of a service stair. The hall, which is situated in the basement, is seated as a theatre, with folding chairs, the audience being about equally divided in area and gallery, each part of the house having separate access and independent emergency doors. Cloak-room and lavatories are situated in the level of the area of the hall, and the smoking-room and light luncheon-room of the refreshment department are so situated that they may be used in connexion with entertainments in the hall. The dining-hall on the first-floor, having wood-panelled walls, is reached both from the Buchanan-street entrance and from St. George's-place by a gallery through the present news-room; with the exception of the service-room and main staircase, it covers the entire site. It is served by dinner and service (passenger) hoists from the kitchen in the top floor of the building. This department consists of a large kitchen, pantries, and sculleries, larders, store-rooms, &c. It contains, also, a servants' hall, with servants' dining-room and lavatory, all served by the service (passenger) elevator. The billiard-rooms are similar to those of the present building in St. George's-place, and give accommodation for six tables. The gymnasium, with its dependencies, like the restaurant, covers the entire site, and has an open floor space of 85 ft. by 30 ft. 6 in. The club-master's private room is close to the main entrance door. The dressing-rooms have bath and lavatory accommodation. A gallery for spectators is carried along one side of the higher part of the gymnasium. The whole building is to be ventilated by forced draught, and is to be lighted by the electric light, from the installation in the basement of the present building in St. George's-place. The floors in the main building vacated by the dining-rooms and the billiard-rooms will be remodelled as class-rooms for the Commercial College, and the news-room, library, and secretary's offices will remain undisturbed in the St. George's-place building. The cost of the extension, it is estimated, will amount to about 15,000*l.* The architects are Messrs. J. Burnet, Son, & Campbell, of Glasgow; the measurers, Messrs. J. Dansken & Purdie; and the clerk of works, Mr. Thomas Douglas.

BANK BUILDINGS, SLIGO.—A branch of the Bank of Ireland has just been opened in Stephen-street, Sligo. It is in the Italian style of architecture, from the design of Messrs. Miller & Symes, Dublin. It was built by Mr. Clarence, of Ballisodare, at a cost of about 6,000*l.* The exterior walling is in Ballisodare limestone in coursed and jointed ashlar, with a rock-faced basement. It is three stories high, the ground floor being devoted to the business department. The upper portion is the residence of the agent. The doors and window dressings, as well as the strings, cornices, &c., are of Mountcharles grit. Two large windows light the office, the walls and ceiling of which are decorated with dentilled cornices and floriated modillions. Exteriorly the office is flanked by a loggia at each side. Festoon capitals of a free Ionic style and a moulded entablature are supported by red Peterhead granite columns and pilasters to match. The jambs of the doors are also of polished granite.

CHANCEL, SEAGOE PARISH CHURCH, IRELAND.—On the 7th inst. Seagoe parish church was re-opened for public worship after having been extensively renovated and enlarged. The chancel is a memorial of the late Mr. Stewart Blacker, D.L., of Carrickblacker. The renovations have been carried out from the designs of Mr. Thomas Drew, R.H.A., and the contractors were Messrs. Collen Bros., Portadown.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, ST. SAMSON'S CHURCH, GUERNSEY.—A stained glass window has just been placed in St. Samson's Church, Guernsey, in memory of the late Mr. and Mrs. Lainé, of La Maison de Haut. The window occupies a central position in the south wall of the south aisle. In shape it is lancet-headed, and consists of two lights, each of which contains a figure with pedestal and canopy. The right-hand figure is that of St. John, with one hand uplifted, and carrying in the other a book. The left-hand figure is that of the Virgin Mary. The small top-light is filled in with the figure of an angel with outstretched wings. The canopies are copied from one of the windows in Rouen Cathedral, and in the architectural design of the pedestals a place has been found for the family arms. The window is in the style of the fourteenth century. The work has been designed by Mr. Oswald Fleuss, of London, and has been executed by Mr. J. Jennings, of London.

NEW WINDOW, LAMBOURN CHURCH, BERKSHIRE.—A new window, from the studio of Mr. Kemp, was recently dedicated at Lambourn Church. The window is of two lights, and represents "Our Lord in Gethsemane."

MEMORIAL WINDOW, STRATFORD-ON-AVON PARISH CHURCH.—The lower portion of the window on the north side of the chancel of the Parish Church, Stratford-on-Avon, behind the Shakespere Monument, has been filled in with stained glass to the memory of the late Mr. J. O. Halliwell-Phillipps, F.R.S., the Shakesperean scholar and commentator. The memorial has been erected by Mr. E. E. Baker, of Weston-super-Mare, nephew and executor of the deceased gentleman. The subject treated represents the prophet Elijah sacrificing upon Mount Carmel and confuting the priests of Baal. The work has been executed by Messrs. Lavers, Barraud, & Westlake, of London.

STAINED-GLASS WINDOW FOR AN ENGLISH CHURCH, ITALY.—Messrs. John R. Lee & Co., of Birmingham, have just completed two stained-glass windows, and have a third in course of completion, for a new English church by the Lake of Como in Italy. The subjects illustrated are the Nativity, the Crucifixion, and the Ascension. The designs and drawings are the work of Mr. Wyndham Hughes. The windows are 14 ft. 6 in. by 4 ft. 6 in.

FOREIGN AND COLONIAL.

BELGIUM.—A committee has been formed at Brussels for erecting, by means of public subscription, a monument to the memory of the Frenchmen who died in 1832 in fighting for the independence of Belgium.

FRANCE.—It is announced that the monument erected at Agen (Lot-et-Garonne) to the memory of the soldiers and *gardes mobiles* killed during the Franco-German war, will be inaugurated on October 15 next. The monument is the work of M. Daniel Campagne.——There has been "inaugurated" at Antibes a bust of General Championnet, who distinguished himself during the wars of the First Republic.——A statue of the Comte d'Astanières, acquired by the State from the last *Salon*, has been placed on the terrace of the Lycée Michelet, at Vanves. This work of art, which was solemnly inaugurated on Sunday last, represents a young soldier leaning on his sword. The pedestal is ornamented with *bas-reliefs*, showing different incidents in the life and drill of young men during regimental service.——A very interesting exhibition of fine arts has been opened at St. Germain-en-Laye; more than two hundred artists are exhibitors.——The authorities of the Department of Fine Arts have given to the town of Gourdon a very fine marble bust representing "The Republic," as well as an interesting collection of medals and engravings.——There has recently been discovered, in a ploughed field at Martres, an earthen vase containing 3,000 silver coins of the Gallo-Roman Period, with very fine effigies of Gallienus, Gordianus, and Valentinian. Various fragments of mortuary sculpture, very well preserved, induce the belief that the field marks the site of a Roman cemetery.——The bust of the painter Cot, who died about two years ago, has been unveiled at Bédarieux, the birthplace of that eminent artist. The bust is the work of M. Mercié.——At Vigan (Gard) on the 22nd inst. will be "inaugurated" the statue of a French sub-officer, Sergeant Triaire, who died "*au champ d'honneur.*" Near to the same town, the Observatory of l'Aigoual, built on a mountain, and commenced in 1887, will shortly be opened.——The sculptor Emmanuel Fontaine, author of the monument erected to Admiral Courbet in the cemetery at Abbeville, has finished the model of his monument of "The Defence of Chateaudun," and M. Falguière, who was requested by the Ministry to examine the design, has expressed a highly favourable opinion of it.——The statue of General Raoult will be inaugurated at Meaux early in October.——It is proposed to erect, in the town of Autun, a monument to General Changarnier, who was a native of the town.——M. Maurice Ferrary, a talented sculptor, has been nominated Chevalier of the Legion of Honour.——The monument erected to the memory of the poet Josephin Soulary, in the square of the Palais des Arts, Place Raspail, Lyons, has been inaugurated.——M. Suchetet, sculptor, has finished the monument to M. Joffrin, the Socialist Deputy, who died last year. The monument, which

is to be erected in the Cemetery of Père-la-Chaise, consists of a tombstone, with sculptured medallion, palm-branch, and wreath.——It is announced that the painter Rochegrosse has made arrangements with an American showman for the exhibition, in the principal cities of Europe and America, of the enormous picture by that young artist representing "The Fall of Babylon;" the picture was in this year's *Salon*.——The restoration, or, rather, the reconstruction, of the Cathedral of St. Front has been completed. There remains nothing more to be done to finish the celebrated Byzantine edifice than to place on the belfry the angel which is to surmount that part of the monument.——A talented lady artist, Mdlle. Rosa Venneman, has become insane, and is an inmate of the Asylum of St. Anne, in consequence of sad disappointments and painful struggles.——The death is announced, at St. Quentin, of M. Lucien Schmidt, painter, as well as that of M. Antonin Richard, Director of the School of Design at Chalons-sur-Marne.——We have also to announce the death of M. Boulanger, artist in ironwork, well known by his important works. He executed the three gates of the portal of the Cathedral of Nôtre Dame, as well as various works in iron in excellent taste for the Cathedrals of Bourges and Nîmes, the Cluny Museum, and the celebrated church at Vézélay. M. Boulanger was entrusted with the restoration of the balcony of the so-called "Charles the Ninth's window" at the Louvre. He was a Chevalier of the Legion of Honour.

MISCELLANEOUS.

The British Archæological Association's Meeting at York.—The forty-eighth annual Congress of the British Archæological Association commenced at York on Monday last, under the presidency of the Marquis of Ripon. We will give a report of the proceedings next week.

Cambridge Meeting of the National Association of Master Builders of Great Britain.—The half-yearly meeting of this Association was held on Tuesday, July 28, at the Old Castle Hotel, Cambridge, under the presidency of Mr. J. C. White, of Liverpool, and representatives were present from London, Liverpool, Manchester, Birmingham, Bradford, Cambridge, Bolton, Leicester, the Potteries, and Preston. The report and accounts for the past half-year were passed and adopted. The questions submitted by the Labour Commission were discussed, and also the question of a form of contract, which is under consideration of the Royal Institute of British Architects. It was also referred to the Council to consider the advisability of establishing in the building trades some system of national federation of employers and employed, somewhat on the lines of similar recent Associations, and also dealing with the pensioning of old and disabled workmen. It was decided to hold the next half-yearly meeting in London. A vote of thanks was passed to the Chairman for his services to the Association during the past half-year.

Stable Drainage.—We have received from Mr. A. T. B. Ward drawings of his system of stable drainage, the principle of which is to avoid all traps in the stable,—"no urine-trapped pits in stable to generate ammonia,"—but to run all drains into an interceptor outside (Mr. Ward incorrectly spells it "interseptor"), which has a movable tray for catching grit or accidental solid matter, so contrived that it can be lifted out without breaking the seal of the trap. The internal drains have a strong movable grating on the top, and a close grating half-way down the section for catching grit; the liquid runs in the bottom, which has a deep, narrow section to promote flow.

Sewage Disposal of Herne and Eddington.—The Rural Sanitary Authority of the Blean Union, Kent, acting for the districts of Herne and Eddington, which are villages situated close to Herne Bay, have requested Messrs. Bailey Denton, Son, & North, of London, to advise them on the question of the sewerage and sewage disposal of the above places, which are rapidly increasing in population and in public favour during the summer season, but which, we understand, are at present without any means of effective sewerage.

Improvement in Lamp-structure.—We have received from Messrs. Pridmore a section and a pattern of a method of fixing the glass oil-holders or "founts" as they are called in the trade, which deserves attention. It has been the custom, we believe, to fix these "founts" on to the stem of the lamp by means of a boss on the under side of the glass, set in a metal matrix in plaster of Paris. It is not surprising if such a mode of fixing leads to danger in unexpected breakage and upsetting of the oil. The method which Messrs. Pridmore have patented is to make the matrix with a corrugated interior surface, and to blow the foot of the glass into it, so that the glass becomes practically of one piece with the metal, and it is impossible that it can ever become loose. The method is simple, effectual, and inexpensive.

Removal.—Messrs. W. H. Lindsay, Neal, & Co. have removed their offices from South Wharf to more convenient premises adjoining their girder works; all future correspondence should therefore be addressed to 15, North Wharf, Paddington, W.

Discovery of Coal near Middlesbrough.—It is stated that the Newcastle Chemical Company, whilst boring experimentally near their salt boreholes at Cowpen, near Middlesbrough, in the hope of finding natural gas, came across a bed of coal 2 ft. thick, about 1,970 ft. from the surface. The coal has been analysed, and, we understand, pronounced to be of very good quality.

The Edinburgh and District Water Supply.—It is understood that the consulting engineers, Messrs. Gale, Hill, and Mansergh, have recommended the Manor district as that to which the trustees should look, in all the circumstances, as a new source of water supply. The report has not yet been printed, but it is further stated that in connexion with the question of the cost of the scheme the engineers have very considerably increased the estimate of 664,000*l.* for 15,000,000 gallons per day from the Manor, which was given by Messrs. Leslie & Reid in 1890. It is suggested that the scheme should be proceeded with in two instalments. Under the first half the supply would be increased by 10,000,000 gallons, and under the second half by an additional 5,000,000 gallons. In accordance with an understanding come to some time ago, the opinion of the Town Councils of Edinburgh, Leith, and Portobello will be taken as to the propriety of proceeding in the next session of Parliament with the scheme.—*Scotsman.*

Discovery of Roman Remains at Twyford.—During the last few days several very interesting bits of Roman remains have been brought to light in the course of excavations that are being made for building purposes at Twyford, near Winchester. About a month ago a paved way, composed entirely of small red tiles, 6 ft. in width and extending probably a considerable distance (a length of 14 ft. was uncovered), was found while digging on the site for flints. The more recent excavations are 20 ft. west of this passage, and there is now to be seen, in a very perfect state of preservation, an oven or kiln with three openings. Five yards away from this is a chamber about 8 ft. square, paved with tiles, and the sides coated with a reddish plaster. On one side is a ledge 15 in. from the ground, extending the whole length of the chamber; on the floor is a sunk channel with an opening at the end for the water to escape. This chamber evidently represents the bath. Portions of the dividing walls of the different chambers have also been discovered, together with various bones, teeth, horns, and ornaments, but very few coins. It is probable that an alteration in the plans of the house which was about to be built on the spot will be made so as to preserve all the more interesting features of these remains in the basement. These discoveries were made at a depth of only 2 ft. or 3 ft. from the surface of the ground, and are within about a quarter of a mile of other remains which were similarly brought to light a few months ago.—*Hampshire Advertiser.*

The English Iron Trade.—The English iron market continues depressed, and it is difficult to determine in what quarter to expect the first signs of improvement. The threatened strike of blast furnace enginemen, &c., has been obviated, the men acceding to the proposed reduction for a time. No. 3 Middlesbrough pig is 9d. lower on the week. From nearly all the pig-iron centres a dearth of orders is reported. Manufactured iron is in moderate request generally. Tinplates remain quiet. Steel continues in very slack request. The demand for old materials is rather more active. Shipbuilding shows a further slight improvement, and it is expected that the riveters' strike on the Clyde will speedily collapse. Engineers generally are slacker. The coal trade is fairly steady.—*Iron.*

College of Agriculture, Downton, Salisbury.—The summer session of this College terminated on Wednesday last, with the usual distribution of certificates, scholarships, and prizes. The following gentlemen received the Certificates of Membership, or Diploma, and the Certificate of practical proficiency, granted after two years' residence, and after passing in all subjects taught in the College: — Mr. P. A. Ouvry, East Acton, London; Mr. P. H. Rawson, Woodhurst, Crawley, Sussex; Mr. G. L. Barker, Llyndir, Wrexham, Denbighshire; Mr. T. F. Egerton, The Mount, Yorks; Mr. R. E. C. Burder, Ham Rectory, Hungerford; Mr. Solomon O. Farmer, Fourah Bay, Sierra Leone; Mr. Payne-Gallwey, Thirsk. The Certificate of practical proficiency was awarded to Mr. G. A. Roper, The Grove, Richmond, Yorkshire; Mr. H. J. Bradshaw, The Grange, Steeple Aston, Oxon; and Mr. E. Hawley, Wimborne, Dorset. The Scholarship, open for competition among first year men only, was won by Captain A. Hicks-Beach (late 60th Rifles), Wick House, Downton. Besides the above, prizes were given for Agriculture, Chemistry, Estate Management, Surveying and Levelling, Building Construction and Drawing, Botany, Entomology, Veterinary Surgery, Mensuration, &c.

MEETINGS.

Tuesday, August 25.

Glasgow Architectural Association.—Visit to Trinity U.P. Church, Pollokshields. 6 p.m.

Wednesday, August 26.

Association of Public Sanitary Inspectors.—Annual Summer Meeting, Hastings.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

13,306.—Spring Door Hinges: *G. A. Farini.*—In the door frame, which is the subject of this patent, is a small casing, in which is a bolt encircled by a spiral spring. The bolt is a fulcrum, and the door a lever compressing the spring and storing up sufficient power to close the door. The apparatus is also applicable to double-action swinging doors.

14,289.—Ventilating, &c.: *F. H. Smith.*—The appliance referred to in this specification consists of a trunk or pipe, one or more of the sides of which are perforated with small holes, fresh air being admitted to such perforated trunk or pipe through a pipe or passage communicating with the air outside the room or space to be ventilated.

14,771.—Glass Tiles: *J. I. de Gough.*—According to this invention, tiles of glass, corrugated so as to conform to the corrugations of the sheet iron, are used, and at the tops of the tiles lugs are formed projecting downwards from their under side at the ends of the several corrugations. These lugs hook over the wooden supports by which the sheets are ordinarily carried, being overlapped by the lower edges of the iron sheets just above them.

813.—Sanitary Apparatus: *T. Ure.*—The apparatus here referred to is claimed to be applicable to ordinary water-closets, ventilating, or other traps, and comprises an outer cylinder case with outlets at bottom, and inlets and ventilating branches, &c., arranged for the purpose of renewal or cleansing without disconnecting the inlet or outlet pipes.

5,365.—Brick-moulds and Fittings: *R. W. Jesson and others.*—In this specification several improvements in detail of brick-making machinery are claimed.

NEW APPLICATIONS FOR PATENTS.

August 4.—13,129, W. Gordon, Gravity Door Bell.—13,172, R. Eccles, Silent Water-waste Preventer.—13,196, H. Gardener, Sashes provided with Sliding Windows, Panels, &c.

August 5.—13,236, L. Cormerio's Suspension Bridges.—13,242, J. Wait, Stench-trap.—13,243, C. Gatchell & A. Gregory, Vice or Clamp.—13,255, C. Schurenberg, Artificial Stones.

August 6.—18,279, F. Feltham, Levelling on Buildings or Sewage Works.—13,285, H. Wain, Rubber Stamps for Tiles, &c.

August 7.—13,344, E. Whiteford, Fixing Sash Cords.—13,357, G. Leighton, sen., Anti-frost Supply Cisterns.

August 8.—13,415, W. Honey, Ventilating Rooms.—13,418, E. Ackers, Treads for Floors, Passages, and Stairs.—13,452, S. Delepine & A. Gomess, Removal of Smoke from Chimneys and Disinfecting Sewers.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,314. C. Horton, Flushing Tanks.—11,671, W. Oswald and J. Henshelwood, Ventilators.—12,086, C. Farrand, Ventilator.—12,571, J. Slack, Enamelled Steel Finger-plates.—12,582, L. Mannings, Self-locking Sash-fastener.—12,741, S. Barrass, Window Sash-fasteners.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

15,617, A. Rose, Window-fastener.—15,811, H. Hardy, Stays and Fasteners for Casement Windows.—15,939, E. Orford, Flush Bolts and Barrel Bolts.—16,071, H. Enoch, Spreader for Water-closets and Urinals.—9,818, C. Banovits, Lock-nuts for Bolts.—10,240, J. Jones, Ventilation of Drains.—11,259, E. Sorel, Materials for the Manufacture of Bricks and other articles, the Building of Fortifications, &c.—11,524, C. Day, Fireproof Buildings and Appliances therefor.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 10.—By *H. Kemp*: 164 and 166, High-st., Peckham, and a leasehold ground-rent of 5*l.*, u.t. 27 yrs., g.r. 55*l.*, r. 210*l.*, 1,400*l.*—By *Robson & Perrin*: 1, 2, and 3, Summerfield-rd., Holloway, u.t. 85 yrs., g.r. 20*l.*, 800*l.*—By *Wood & Kirby*: 5, Oldham-ter., Acton, f., r. 13*l.*, 105*l.*; 13, 14, and 15, Oldham-ter., f., r. 46*l.* 16s., 450*l.*; 12 and 16, Ledbury-villas, u.t. 72 yrs., g r. 10*l.*, r. 52*l.*, 200*l.*; 14, Bromfelde-rd., Clapham, u.t. 79 yrs., g.r. 4*l.*, 330*l.*; 3, Charlwood-st., Westminster, u.t. 33 yrs., g.r. 6*l.*, 350*l.*

August 11.—By *Walton & Lee*: 23 and 25, Brigstock-rd., Thornton Heath, f., 1,775*l.*—By *Debenham, Tewson, & Co.*: 13, Woodsome-rd., Highgate-rd., u.t. 71 yrs., g.r. 7*l.*, 330*l.*; a profit rental of 45*l.* a year, Aldersgate-st., u.t. 15 yrs., 410*l.*; 83, York-rd., Lambeth, with goodwill, u.t. 32 yrs, r. 50*l.*, 570*l.*

August 12.—By *T. B. Westacott*: 146, Farringdon-rd., City, u.t. 63 yrs., g.r. 9*l.*, r. 80*l.*, 700*l.*—By *Wyatt & Son* (at Chichester): "Hayes Farm," Highleigh, near Chichester, and 30a. 1r. 36p., f., r. 60*l.*, 1,160*l.*; enclosures of arable land, 18a. 1r. 35p., r. 35*l.*, 660*l.*; enclosures of land, 4a. 3r. 30p., f., 230*l.*—By *Humbert, Son, & Flint* (at Chesham): 108, High-st., Chesham, Bucks, f., r. 25*l.* 10s., 800*l.*; 110 and 112, High-st., f., r. 20*l.* 2s., 490*l.*; 114, High-st., f., r. 15*l.*, 450*l.*

August 13.—By *Abercrombie & Edmunds*: 156 Loveridge-rd., Brondesbury, u.t. 71 yrs., g.r. 5*l.*, r. 45*l.*, 413*l.*—By *Newbon & Co.*: 56, Hamilton-rd, Highbury, u.t. 41 yrs., g.r. 6*l.*, r. 56*l.*, 410*l.*; 14 to 20 (even), Orchard-st., Islington, u.t. 37 yrs., g.r. 11*l.*, 395*l.*; 40 and 42, Edith-rd., Peckham, u t. 73 yrs., g.r. 16*l.*, 420*l.*—By *E. Stimson*: 3 to 6, Norman-villas, Dulwich, u.t. 70 yrs., g.r. 25*l.* 4s., r. 109*l.*, 825*l.*; 10 to 18 (even), Salisbury-pl., Bermondsey, u.t. 37 yrs., g.r. 35*l.*, r. 126*l.* 2s., 145*l.*; 1, 2, and 3, Cook's Cottages, Peckham, f., r. 39*l.*, 390*l.*; 1 to 11 (odd), Warple Way, Wandsworth, f., r. 93*l.* 12s., 640*l.*; 78 to 86 (even), Warple Way, f., r. 67*l.* 12s., 465*l.*; 11, 12, and 14, Hastings Villas, Green-lanes, f., r. 54*l.*, 540*l.*; 1 and 2, Park Villas, f., r. 36*l.*, 330*l.*; 63 and 65, Kender-st., New Cross, u.t. 60 yrs., g r. 2*l.*, r. 53*l.* 6s., 365*l.*; 26, Swaffield-rd., Wandsworth, u.t. 94 yrs., g.r. 5*l.*, 100*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	8/0/0	9/0/0
Teak, E.I.. load	8/0/0	14/0/0
Sequois, U.S.ft.cu.	2/3	3/0
Ash, Canada load	2/5/0	4/0/0
Birch, do.	2/5/0	4/5/0
Elm, do.	3/5/0	4/15/0
Fir, Dantzic, &c.	2/0/0	3/10/0
Oak, do.	2/10/0	4/10/0
Canada.....	4/17/6	6/10/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/0/0	5/0/0
Lath, D'ntzic, fath	5/0/0	6/0/0
St. Petersburg	5/0/0	7/0/0
Deals, Finland, 2nd & 1st std 100	7/15/0	10/0/0
Do, 4th & 3rd..	7/5/0	8/5/0
Do. Riga	6/5/0	7/15/0
St. Petersburg, 1st yellow ..	9/15/0	14/0/0
Do. 2nd yellow	8/5/0	9/5/0
Do. white	6/15/0	10/0/0
Swedish	6/15/0	15/10/0
White Sea	8/5/0	17/0/0
Canada, Pine 1st	12/10/0	24/0/0
Do. do. 2nd....	9/0/0	15/10/0
Do. do. 3rd, &c.	6/10/0	10/0/0
Do. Spruce. 1st	8/0/0	10/10/0
Do. do. 3rd & 2nd.....	6/0/0	7/10/0
New Brunswick	5/5/0	7/5/0
Battens, all kinds	3/10/0	15/10/0
Flooring Boards, sq., 1 in. prep. 1st	0/10/0	0/13/6
Do. 2nd.....	0/9/0	0/10/6
Other qualities	0/4/6	0/7/6
Cedar, Cuba ..ft.	/4	/4½
Honduras, &c.	/5½	/4½
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4½	/6½
Mexican do. do	/4½	/5
Tobasco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	10/0/0	20/0/0
Bahia	9/0/0	18/0/0
Satin, St. Domingo . ....ft.	0/0/9	0/1/3

TIMBER (*continued*).		
Satin, Porto Rico	0/0/10	0/1/6
Walnut, Italian..	0/0/3½	0/0/7
METALS.		
Iron—Pig, in Scotland .....ton	47/4/6	0/0/0
Bar, Welsh, in London.....	6/5/0	6/15/0
Do. do. at works in Wales	5/15/0	6/5/0
Do, Staffordshire, in London	6/5/0	7/0/0
Copper—British, cake and ingot	58/10/0	59/0/0
Best selected ..	59/10/0	60/10/0
Sheets, strong..	68/0/0	0/0/0
Chili, bars	52/12/6	53/0/0
Yellow Metal lb.	0/0/6	0/0/6½
Lead—Pig, Spanish....ton	12/2/6	12/5/0
English, com. brands	12/5/0	12/10/0
Sheet, English, 3 lbs. per sq. ft. and upwards ..	14/0/0	0/0/0
Pipe	14/10/0	0/0/0
Zinc—English sheet .....ton	27/0/0	0/0/0
Vieille Montagne.....	27/10/0	0/0/0
Tin—Straits	92/2/6	92/12/6
Australian	93/2/6	93/12/6
English Ingots	0/0/0	0/0/0
OILS.		
Linseed .....ton	20/7/6	20/15/0
Cocoanut, Cochin	30/10/0	0/0/0
Do. Ceylon	26/5/0	24/10/0
Palm, Lagos	26/0/0	26/10/0
Rapeseed, English pale	32/5/0	32/10/0
Do. brown	31/0/0	0/0/0
Cottonseed ref...	21/0/0	21/5/0
Oleine	0/0/0	0/0/0
Lubricating, U.S.	5/0/0	6/0/0
Do. refined	8/0/0	12/0/0
Tar—Stockholm barrel	0/18/0	0/18/6
Archangel	0/12/6	0/13/0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

BALHAM.—For building seven houses at Balham for the Imperial Land Company. Mr. E. Crosse, architect:—

Peacock	£2,296	Oldman	£1,767
A. White & Co.....	2,199	Lorden & Sons (too late).	

COPSTON MAGNA (Warwickshire).—Accepted for additions and repairs to house and farm buildings, for the Earl of Denbigh. Mr. Henry H. Cave, architect, The Manor House, Brigg, Lincolnshire:—

Lord, Sharnford £401 5 0

CROYDON.—For alterations and additions to Christ Church Schools, Croydon. Mr. R. W. Price, architect, London:—

M. Taylor (amended estimate: accepted)..... £2,029 0 0

DYNAS POWIS (Glamorganshire).—For widening and improving Weycock-road, for the Highway Board, Dynas Powis District. Mr. E. Raymond Lewis, Surveyor, Llancarvan, near Cardiff:—

F. Ashley	£1,976	T. Jones Davies, Pontcanns, Cardiff*	£1,075
David Lowe	1,119		
W. Davies.....	1,090	W. Adamson	999

* Accepted.

EALING.—For additions and alterations to Cambridge-villas, Uxbridge-road, Ealing, for Dr. Fenton, of Ealing. Mr. Robert Willey, architect, 66, Ludgate-hill, E.C.:—

T. Nye.....	£1,390	Down, Ealing Dean*	£1,225
Adamson	1,348		

* Accepted.

EALING DEAN.—For additions and alterations to St. John's schools, for the Extension Committee. Mr. Robert Willey, architect, 66, Ludgate-hill:—

Holliday & Greenwood	£875 0 0	Nye	£575 0 0
Williams	793 0 0	Down, Ealing Dean* .	541 13 0
Brown.....	639 10 0		

* Accepted.

HENDON.—For alterations and fittings to the "Red Lion" public-house, for Messrs. Michell & Phillips. Messrs. Raymond & Webb, architects. No quantities:—

Gould & Brand	£684	H. B. Oldrey	£589
F. T. Chinchen	635		

JARROW.—For alterations and additions to the "Rolling Mill" tavern, Western-road, Jarrow, for Mr. M. Wood. South Shields. Mr. H. Grieves, architect, Albany-chambers, South Shields:—

S. Sheriff	£632 5 1	Storar & Son, Jarrow*	£615 14 0
T. Lumsden.....	629 0 0		

* Accepted.

KEW.—For erecting residence at Kew, for Mr. P. N. Jones. Mr. John W. Rhodes, architect, 3, Clifford's-inn, E.C. Quantities by Mr. Charles J. Ford, 3, Clifford's-inn, E.C.:—

Shillitoe & Son	£1,342	H. M. Moody	£1,097
T. Stevens.....	1,241	F. Gladwell, Hornsey, N.*	1,075

* Accepted.

LINCOLN.—For the erection of St. Hugh's Roman Catholic Church, for the Very Rev. Canon Croft. Mr. Albert Vicars, architect, Somerset-chambers, 151, Strand:—

		Cr. Old Material.	Net.
Adams	£10,218	£50	£10,168
Halliday	8,937	45	8,892
Dove	8,745	Nil	8,745
Goddard	8,230	40	8,190
Pattinson.....	7,857	50	7,807
Shillitoe	7,693	50	7,643
Calvert.....	7,625	Nil	7,625
Wright.....	7,436	20	7,416
Close.....	7,348	38	7,310

LONDON.—For rebuilding No. 11, Seven Sisters'-road, as branch premises for Messrs. Lipton, for Mr. W. A. Bilney. Messrs. Pooley & Follett, architects, 21, John-street, Adelphi, W.C. Quantities supplied:—

F. G. Davis	£1,900	Gould & Brand	£1,589
Simmonds Brothers	1,864	J. W. Meller, Willes-road, N.W.*	1,566
R. D. Lown & Sons.....	1,670		
Reuben Hill	1,657		

* Accepted.

LONDON.—For alterations and additions to Normand House, Fulham, S.W. Mr. C. L. R. Tudor, architect, 81, Lancaster-road, Notting-hill, W. Quantities by M. Charles J. Ford, 3, Clifford's-inn, E.C.:—

Shillitoe & Son	£1,175	H. H. Hollingsworth.....	£1,123
Holloway Bros.	1,169	H. & E. Lea	1,123
W. Nash.....	1,140	H. M. Moody, Folkestone*.	1,045

* Accepted.

LONDON.—For alterations and additions to St. Mark's Schools, Notting-hill, W. Mr. C. L. R. Tudor, architect, 81, Lancaster-road, Notting-hill, W. Quantities by Mr. Charles J. Ford, 3, Clifford's-inn, E.C.:—

H. Lindfield	£460 0	W. Nash	£387 10
F. Holdstock..... ...	426 0	H. & E. Lea, London*....	357 0
G. N. Watts	400 0		

* Accepted.

LONDON.—For the alteration, ventilation, painting, and decorating of the Vestry-hall and offices, Upper-street, Islington, N., and for the construction of strong-rooms, for the Vestry of St. Mary, Islington. Mr. J. Patten Barber, C.E., Chief Surveyor:—

Holliday & Greenwood	£1,475	Stevens Bros., 148, Seven Sisters'-road, N.*.....	£1,294
Robt. Eddie	1,398		
Macfarlane Bros.	1,336		

* Accepted.

LONDON.—For alterations at the Royal Victoria Hall, Waterloo Bridge-road, S.E. Mr. E. Hoole, architect:—

Co-operative Builders	£420	Macfarlane Bros.*	£320
J. O. Richardson	401		

* Accepted.

LONDON.—For alterations, repairs, painting, and decorating at the Coroner's Court and Mortuary Buildings in the grounds of the Chapel of Ease, Holloway-road, N., for the Vestry of St. Mary, Islington. Mr. J. Patten Barber, C.E., Chief Surveyor:—

R. Metcalf	£410 0	W. E. Jaques.....	£198 0
C. M. Prout.....	218 0	Stevens Bros., 148, Seven Sisters'-road, N.*	193 15
Jas. Webb	215 0		

* Accepted.

LONDON.—Accepted for paving with patent Pengarvon stone, 1 in. thick, at the "Duke of Lancaster," Kingsland, N.E., for Messrs. Truman, Hanbury, & Co.:—

Lewis Griffiths, Bromley-by-Bow, E., 3s. 3d. per yard.

LONDON.—For new premises, No. 1, Denmark-hill, for Mr. E. Jones. Mr. J. C. Reynolds, architect:—

Whitehead	£1,455	G. Parker	£1,298
W. Shurmur..... ...	1,323	G. Ford	1,248
J. & H. Cocks	1,320		

LONDON.—For reconstructing the drains at No. 8, Chesham-place, Belgrave-square, S.W. Mr. Edward S. Mansergh, surveyor, 28, Mount-street, Grosvenor-square. W.:—

The Sanitation Co., 14, Victoria-street, S.W.* .. £246 0 0

* Accepted.

LONDON.—Accepted for hot-water fittings, &c., at 20, Park-lane W. Mr Edward S. Mansergh, surveyor, 28, Mount-street, Grosvenor-square, W.:—

The Sanitation Co., 14, Victoria-street, S.W. £118 0 0

LONDON.—For rebuilding the "Princess Royal" beer house, Cable-street, E. Mr. C. A. Legg, architect:—

W. Ayres	£7,695	Hearle & Farrow	£2,371
S. Salt.....	2,477	W. J. Maddison	2,310
F. & F. J. Wood	2,439	Calnan & Co.	2,208
W. Shurmur.....	2,394	Coulsell Bros.	2,133

LONDON.—For paving the macadamized margins of portions of Holloway-road and Highgate-hill, Upper Holloway, with granite setts, for the Vestry of St. Mary, Islington. Mr. J. Patten Barber, C.E., Chief Surveyor, Vestry-hall, Upper-street, N.:—

G. G. Rutty	£7,659 10 10	Nowell & Robson ..	£6,130 15 3
Turner, Son, & Evanson	6,279 10 0	Wm. Griffiths, 283, Kingsland-road* ..	5,799 12 6
Mowlem & Co.....	6,230 2 6		

* Accepted.

LONDON.—For alterations, repairs, and redecorating the "Trafalgar Hotel," Greenwich, for Mr. Aukers Moore. Mr. Thos. Dinwiddy, architect, Crooms-hill, Greenwich:—

H. L. Holloway, Deptford (accepted) £783 0 0

[No competition.]

LONDON.—For the erection of a new factory and warehouses, on the site of Gay's-buildings, Hackney-road, for Mr. Henry Warden, 38, Noble-street, E.C. Messrs. Brunsden & Henderson, surveyors, 3, Barbican, E.C.:—

J. Vears & Co.	£2,999	James Steed	£2,695
Treasure & Son	2,997	W. Shurmur.....	2,655
E. Toms.....	2,846	J. Jarvis & Sole*	2,545
Mattock Bros.	2,733		

* Accepted.

LUTTERWORTH (Leicestershire).—Accepted for the erection of a farmhouse, outbuildings, &c., Denbigh Arms Farm, for the Earl of Denbigh. Mr. Henry H. Cave, architect, The Manor House, Brigg, Lincolnshire:—

Law & King, Lutterworth..... £543 0 0

MAESTEG (Glamorganshire).—Accepted for the erection of an hotel, at Blaen Llynvi, near Maesteg, for Mr. James Edwards, Cardiff. Mr. G. F. Lambert, architect, Bridgend. Quantities by the architect:—

W. Lissiman, jun., Chipping Campden £2,380 0 0

[Seven tendered.]

PAIGNTON.—For the erection of proposed teachers' residence, for the Paignton School Board. Mr. Geo. Soudon Bridgman, architect. Quantities supplied:—

H. Webber	£474 0	F. Vanstone	£449 0
G. Webber	471 0	C. & R. E. Drew	449 0
E. Westlake	449 10	Rabbich & Brown	412 0

PLAISTOW (Essex).—Accepted for converting Nos. 66 and 68, Barking-road, into shops, for Mr. J. H. Pavitt. Mr. A. J. Dale, architect, Barking-road, Plaistow, E.:—

J. G. Horlock..... £917 0 0

ROMFORD (Essex).—Accepted for supplying 500 ft. run of 12 in. by 6 in. Norwegian edge-kerb, and 1,150 ft. run 12 in. by 6 in. flat ditto, to the Romford Local Board of Health:—

Lewis Griffiths, Bromley-by-Bow, E., 1s. 4d. per ft. run.

SURBITON.—For additional schoolroom and offices at "St. Bernard's," Surbiton-hill, Surrey, for Mr. Andrew Lockie. Mr. C. H. Wiltshire, architect, 13 and 15, Walworth-road, London, S.E.:—

Holloway Bros.	£633	R. Scase & Son*	£519
Adkins Bros.	528		

* Accepted.

WARLINGHAM.—For erecting four small villa-residences for Mr. George Cutt. Mr. M. Edward Clark, architect, 47, Strand. Quantities supplied:—

John Anley	£3,200	E. J. Saunders.....	£3,020
L. Whitehead & Co.	3,150	Martin Taylor *.....	2,970
Messrs. Ward	3,080		

* Accepted.

WOKING.—For re-constructing the Elm Bridges, at Kingfield, Woking, for the Guildford Highway Board. Messrs. Peak & Lunn, surveyors:—

T. E. Downes	£965 0 0	Tribe & Robinson	£746 4 0
John Fell	930 0 0	G. A. Franks	685 10 0
George Double.....	822 0 0	Richard Chamberlain.	683 6 9
Harris & Son	812 0 0	W. Smith & Son.....	674 13 0
T H. Kingerlee	789 0 0	James Whitburn, Woking*	670 0 0
Martin Wells & Co....	789 0 0		
Mitchell Bros.....	770 0 0	Higlett & Hammond..	644 12 8
P. C. May	748 0 0		

* Accepted.

WOODFORD.—For building private dwelling-house for Mr. J. R. Roberts. Mr. J. Kingwell Cole, architect Quantities by Mr. Edward S. Mansergh, 28, Mount-street, Grosvenor-square, W:—

Bryant	£2,700	T. Osborn	£2,495
Morter	2,690	Wells	2,495
Dove Bros.....	2,675	Hack	2,398
Nightingale & Co.	2,515	Faulkner	2,395
Chafen	2,513	Harris & Wardrop (accepted)	2,380

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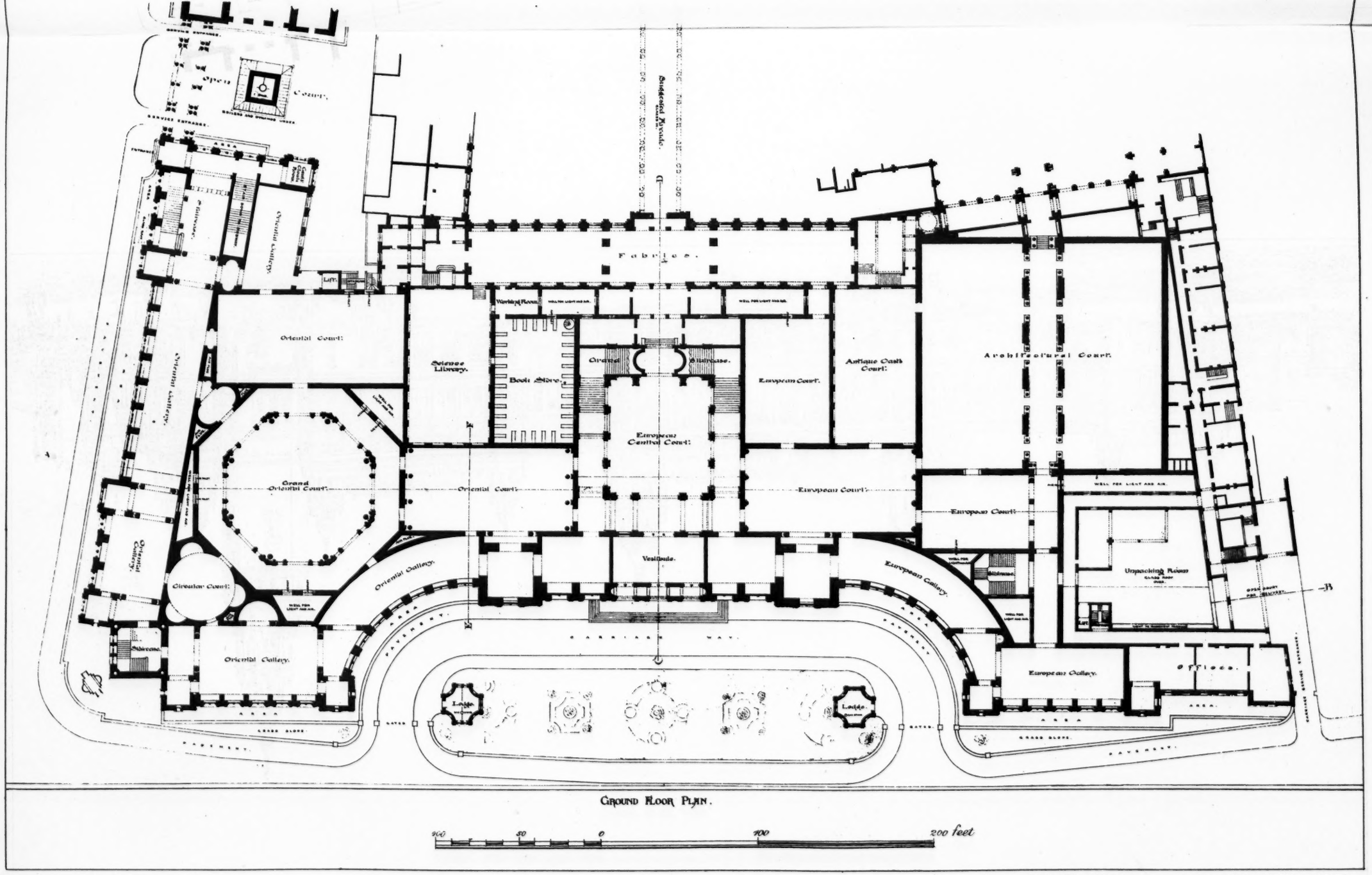

GROUND FLOOR PLAN.

100 50 0 100 200 feet

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SOUTH KENSINGTON MUSEUM COMPETITION.—DESIGN SUBMITTED BY MR. WM. YOUNG

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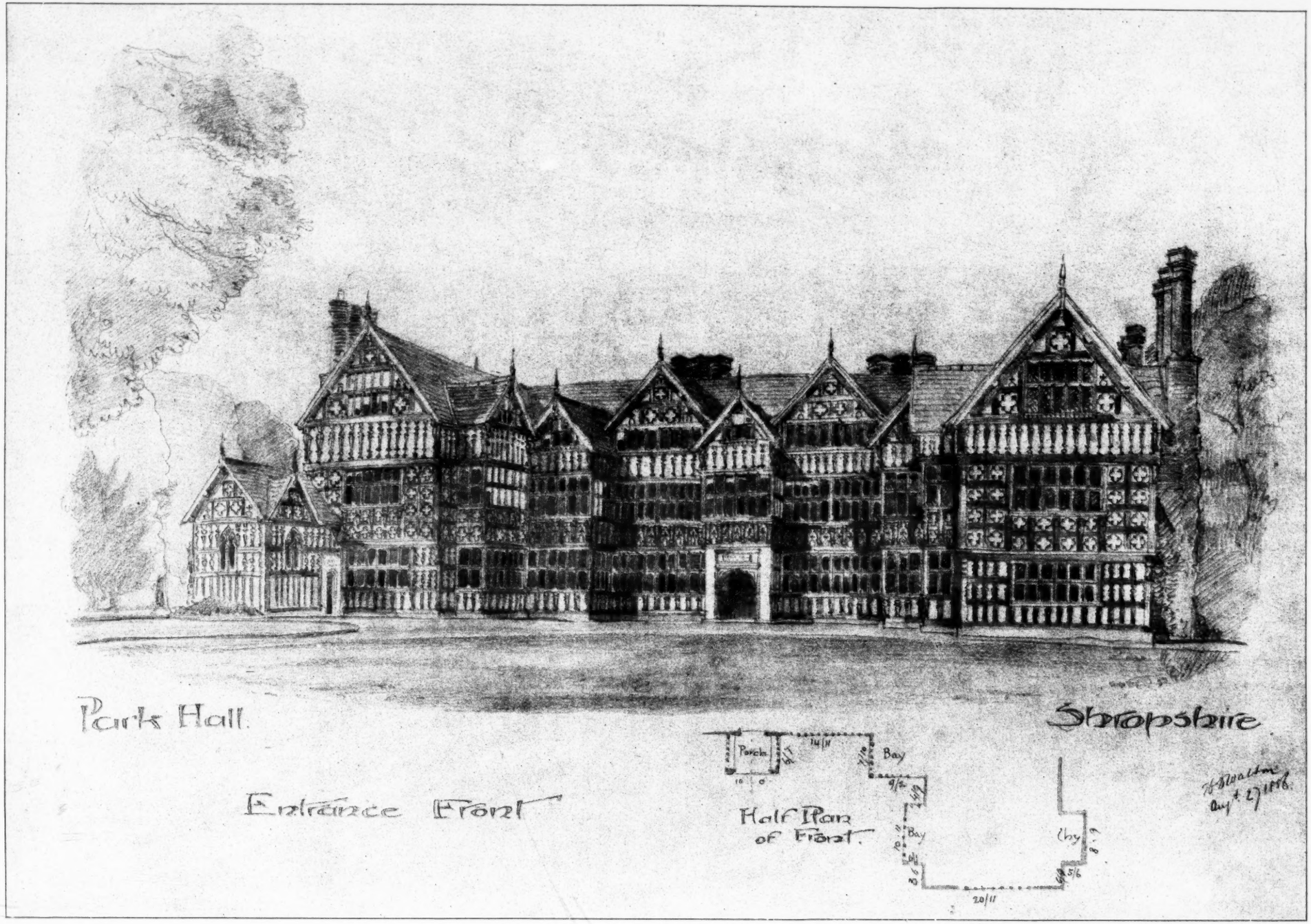
Royal Academy Exhibition, 1891



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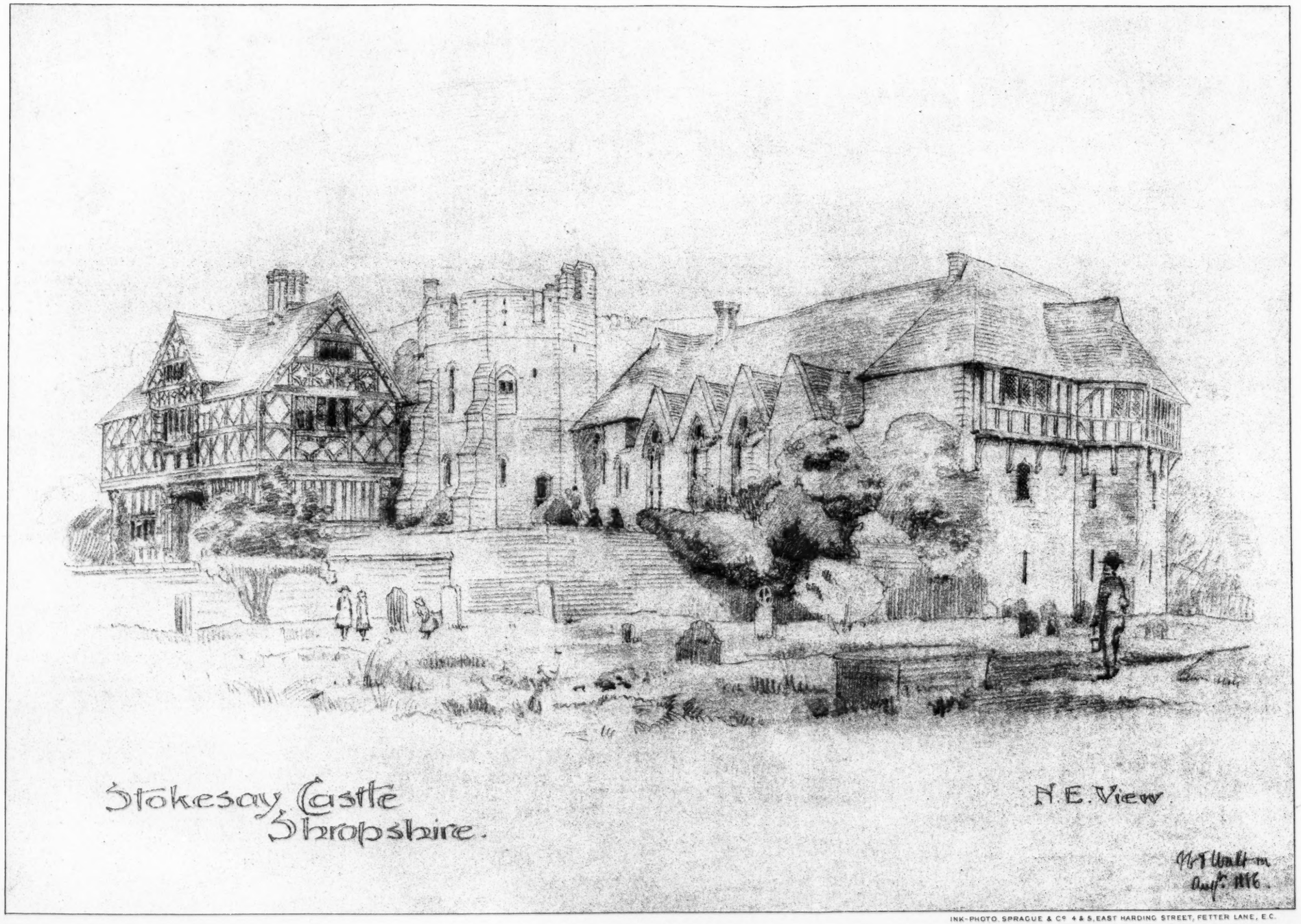

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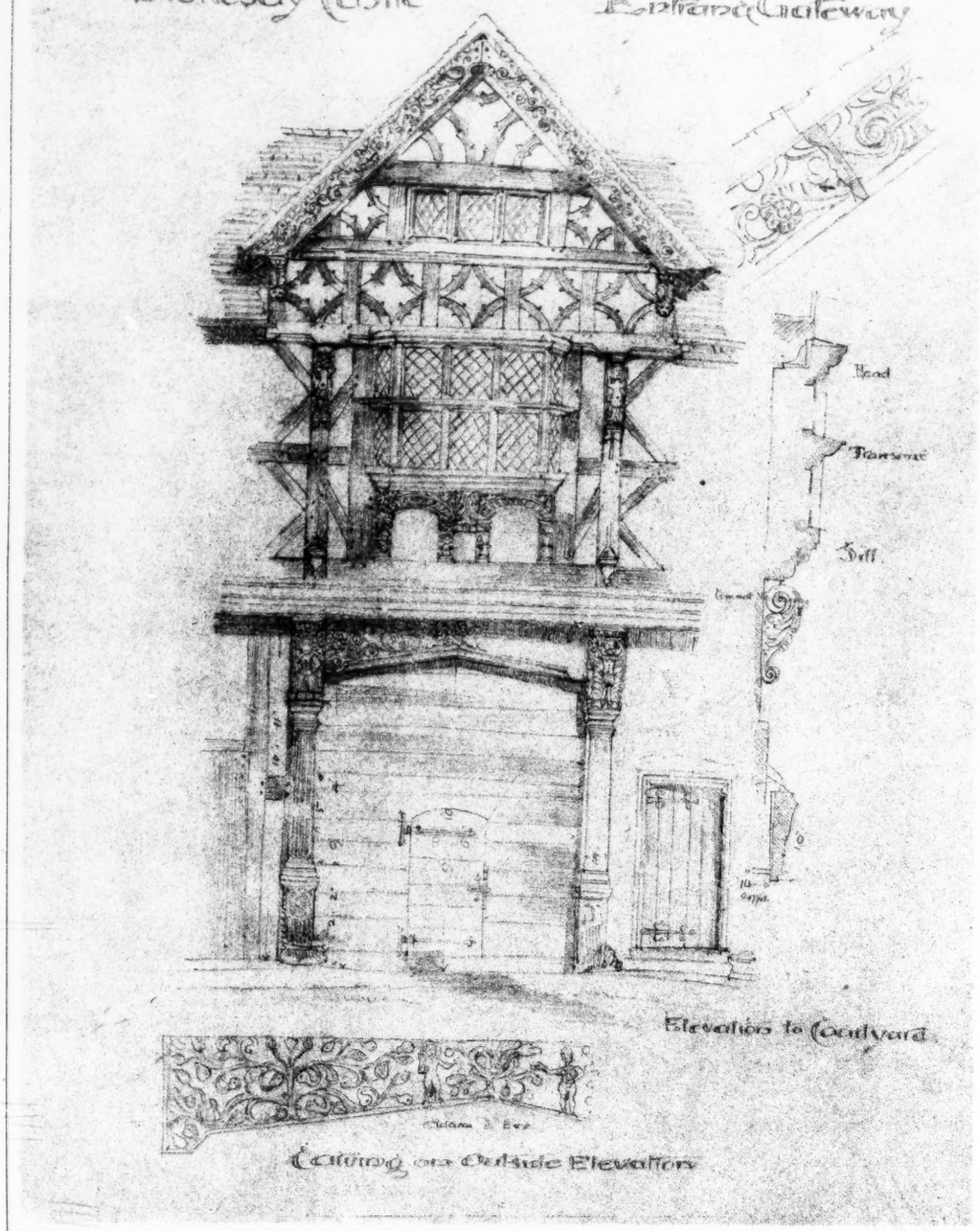
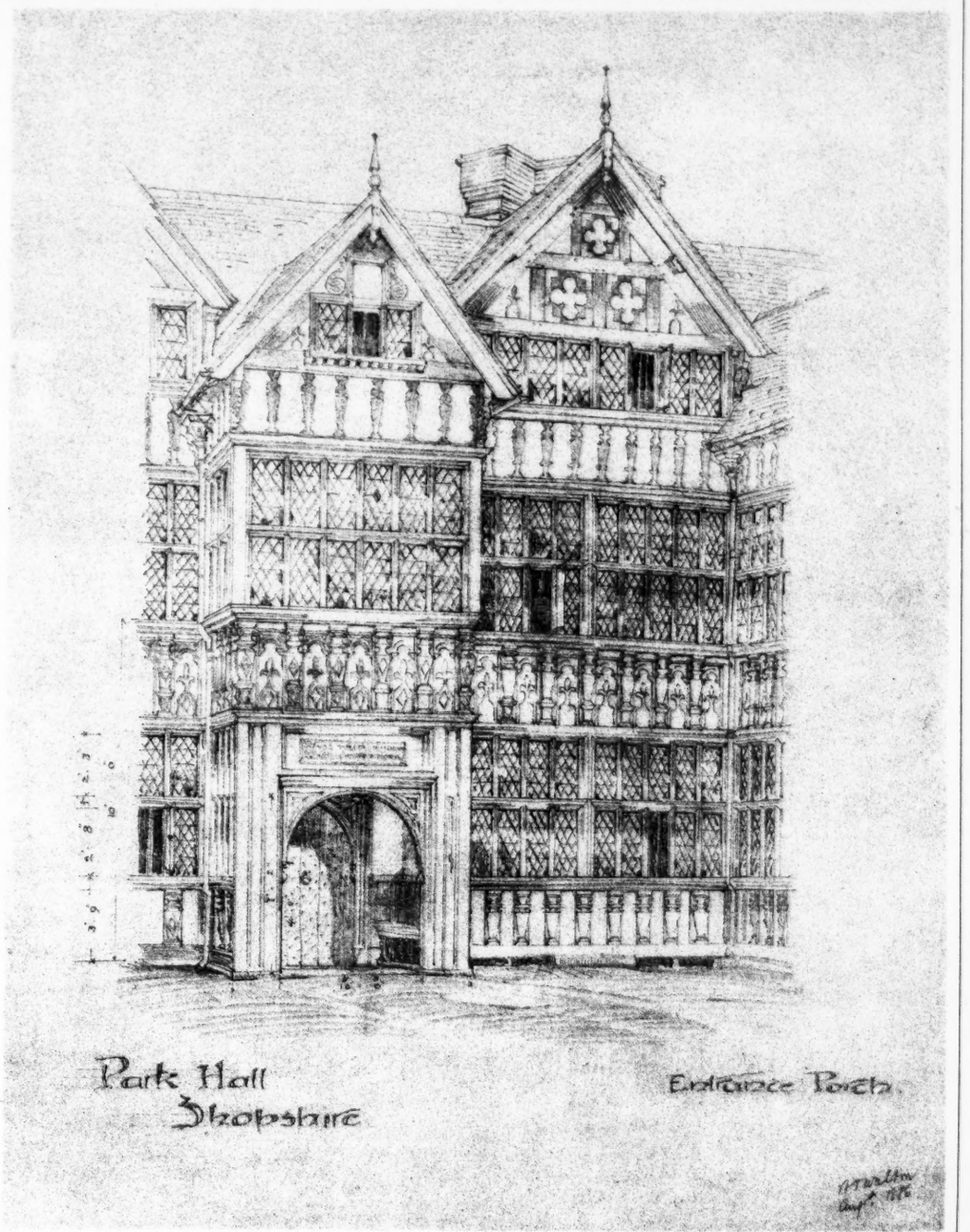
Stokesay Castle

Entrance Gateway





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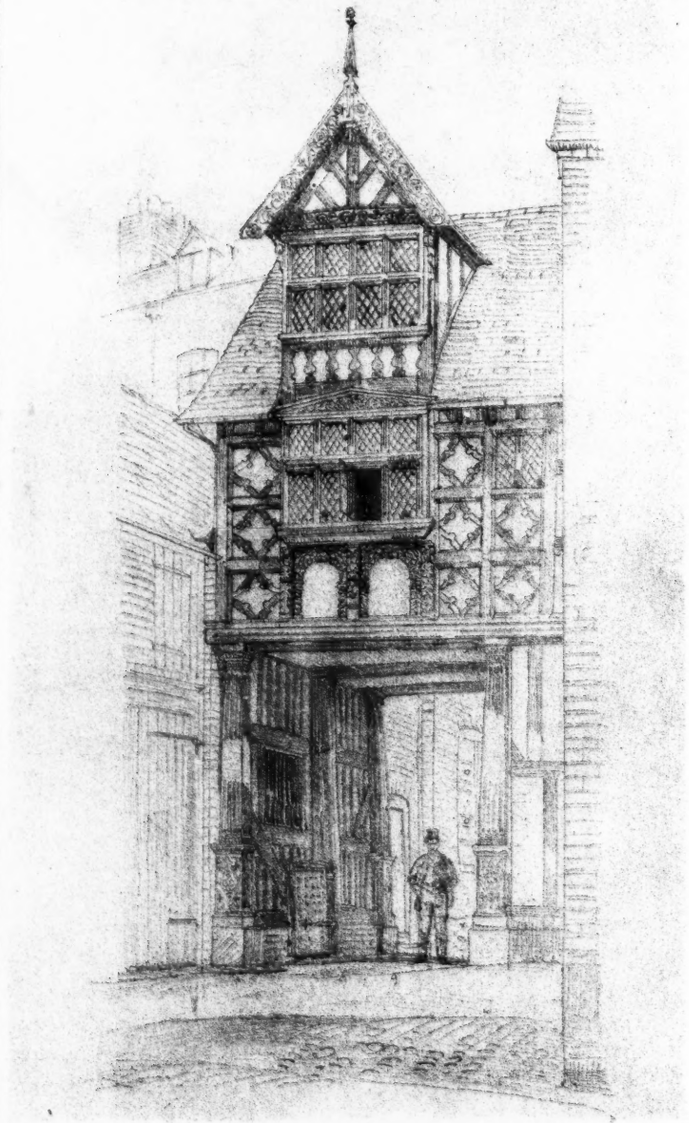

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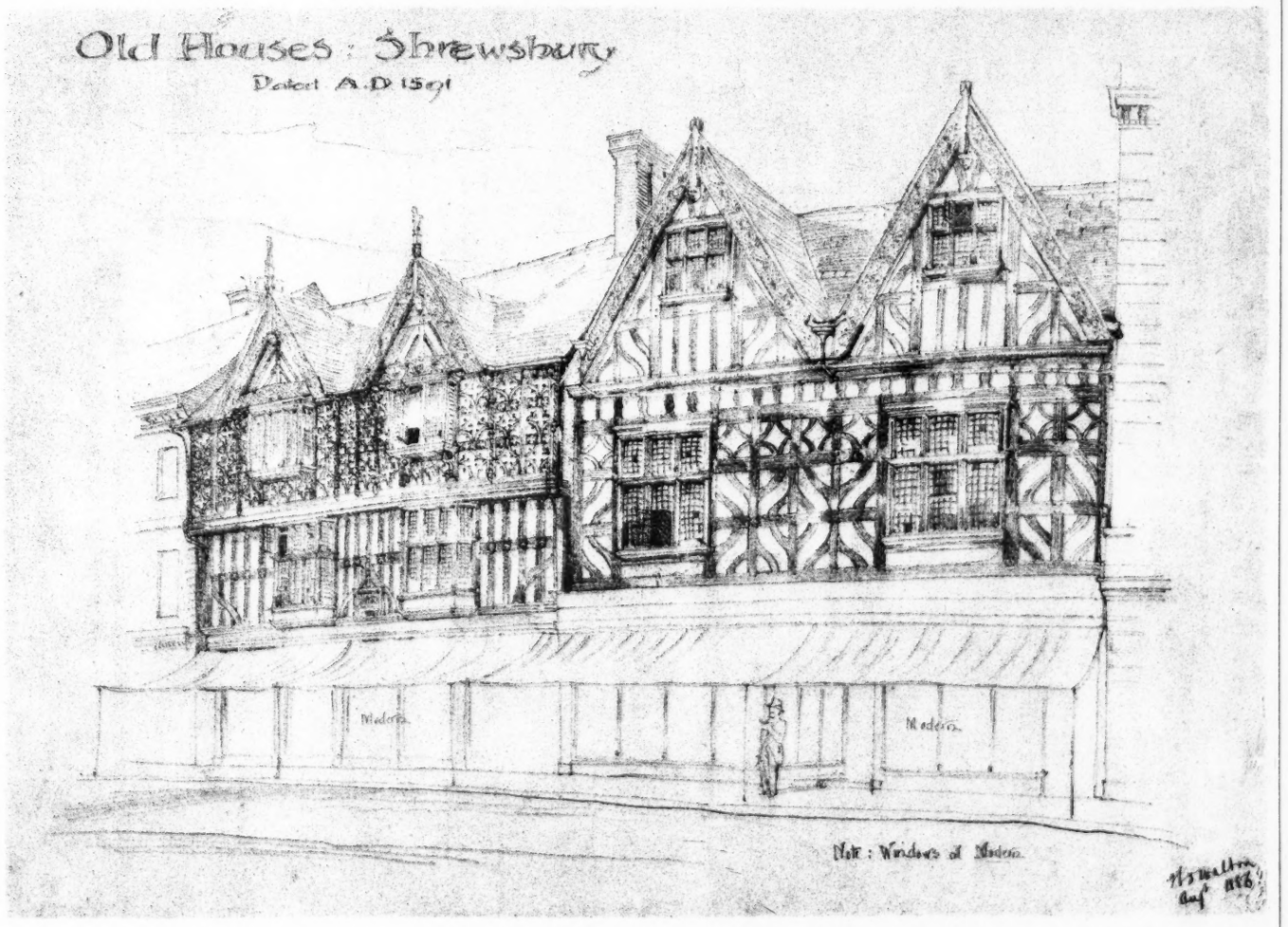

Guildhall
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